countries and organizations offering aid to the agriculture and livestock sector has been increasing recently, although the manner in which the agriculture and livestock sectors in Mongolia are understood and what form such assistance takes are based on the specialties of each respective country and organization.

For example, DANIDA, which is providing assistance for the improvement of intensive dairy farming, proposed that herds of 10 to 20 cows and nomadic ranching be combined as a form of dairy farming suitable for Mongolia, and is working to demonstrate the effectiveness of this proposal. In addition, the FAO/ADB proposed in its irrigation rehabilitation project to exclude cereals and feed from the project, concentrating on production of fruits and vegetables on a scale of about 500 ha, and change from existing methods of irrigation with their emphasis on large-scale operations.

2.5.2 Trends in Bilateral and Multi-national Aid

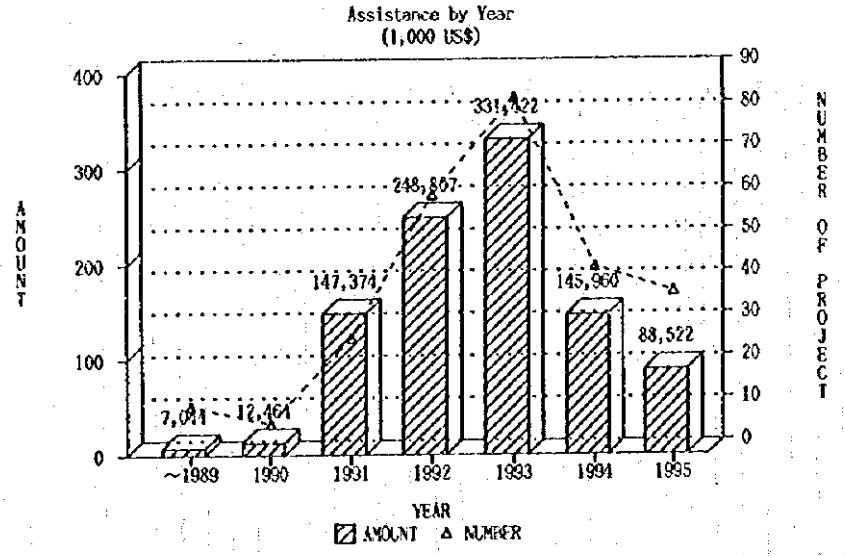
1) Aid Trends by Year

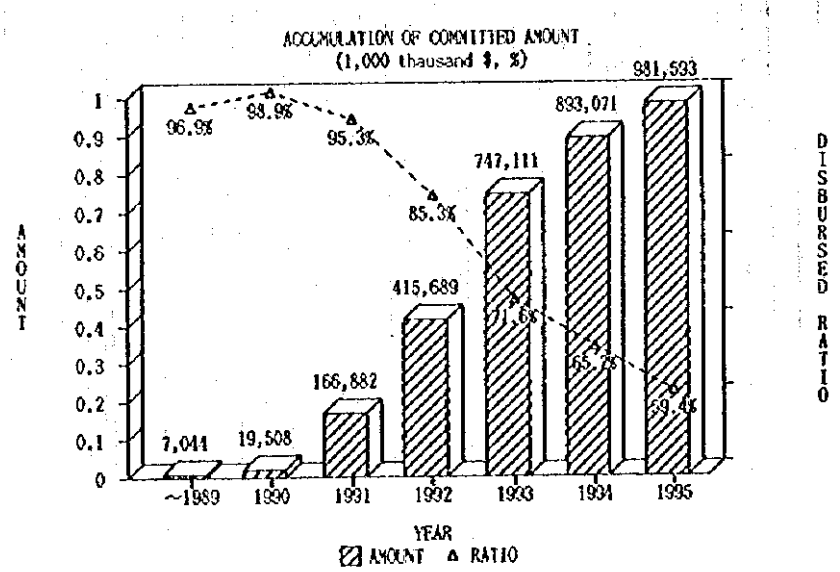
A study of accumulated aid to Mongolia committed as of the end of December 1995 reveals a total of 264 contributions worth slightly less than $1 billion. In February 1991, Mongolia joined the IMF, WB, and ADB, moves which sharply increased both the number of aid commitments and their value. After peaking in 1993, aid commitments have fallen off, starting in 1994, but the country still received a total of $564 million between 1991 and 1995. This equals about 18% of the total GDP for the country during this period (and about 30% of the committed aid).

As this aid has climbed, the rate of disbursement of the committed amount has declined each year, with about 40% of the aid committed thus far, or some $400 million (about 70% of 1995 GDP) remaining unpaid by the end of 1995. This is a result of assessments by donor organizations of the progress achieved in structural adjustments or methods of disbursement that account for the effect of the aid. Another factor assumed to be behind this decline, however, is a shortage of the government personnel resources and management capabilities needed to absorb this aid, a problem revealed by the rise in the amount of aid provided to Mongolia (Table 2.5.2.1).

Table 2.5.2.1 Assistances by Starting Year (1,000US$)

Year	No. pro.	Share by year	Committed amount	Disbursed amount	Disbursed ratio	Total No.	Total committed	Total disbursed	Disbursed ratio
~1989	8	3.1%	7,044	6,825	96.9%	8	7,044	6,825	96.9%
1990	4	1.5%	12,464	12,464	100.0%	12	19,508	19,289	98.9%
1991	24	9.2%	147,374	139,702	94.8%	36	166,882	158,991	95.3%
1992	58	22.1%	248,807	195,528	78.6%	94	415,689	354,519	85.3%
1993	81	30.9%	331,422	180,170	54.4%	175	747,111	534,689	71.6%
1994	41	15.6%	145,960	47,931	32.8%	216	893,071	582,620	65.2%
1995	35	13.4%	88,522	419	0.5%	251	981,593	583,039	59.4%
1996	10	3.8%	1,860	760	40.9%	261	983,453	583,799	59.4%
1997	1	0.4%	0	0	-	262	983,453	583,799	59.4%
Total	262	100.0%	983,453	583,799	59.4%	-	-	-	-





2) Trends in Types of Aid

The types of aid being provided to Mongolia are classified according to UNDP into balance of payment support (BOP), technical assistance (primarily grants: TA), capital assistance (mainly loans: CA) and commodities assistance (AIK: aid-in-kind). BOP accounts for 41% of the total, while TA 23%, CA 30% and AIK 6% the remainder, respectively. The main form of aid is shifting from BOP, which accounted for 64% of all aid in 1991, to TA and CA.

Table 2.5.2.2 Commitment by Type of Assistance

(US$ 1,000)

	BOP	TA	CA	AIK	91-93.8月
Bilateral	112,662	125,800	110,833	45,097	394,392
(Japan)	(85,543)	(16,996)	(40,892)	(7,339)	(150,770)
Multi-nat'l	207,500	55,325	125,300	4,156	392,281
Total	320,162	181,125	236,133	49,253	786,673

SOURCE: UNDP

3) Situation by Sector

Aid is provided to Mongolia for many purposes and sectors, with transportation, communication, energy, and other social and economic infrastructure purposes accounting for the largest share at around 40%. The next largest area, at about 25%, consists of aid to finance macro-adjustments and systems, structural adjustments such as policy reform, and improvements to administration and management.

In the area of food and agriculture, very little, or less than 5%, of all aid is direct aid to farms, although most food aid (AIK) consists of aid used to acquire food and agricultural machinery, fertilizer, and other agriculture related materials,. When this type of aid is regarded as agricultural aid, the agricultural sector then ranks third after the two areas described above.

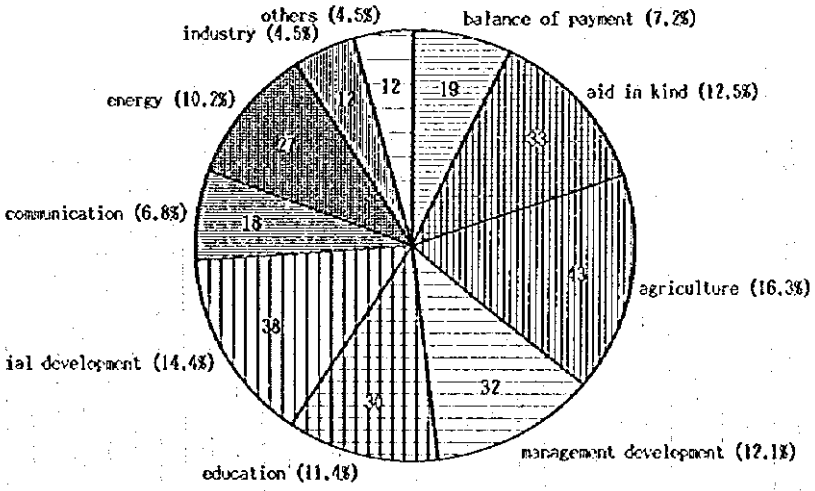
The above is a reflection of the tendency by donors' to put top priority on improving the country's infrastructure: the provision of the basic systems and social and economic foundations needed to operate a market economy. It is also a reflection of the awareness that agriculture is the foundation of the economic and social life of the nation.

Disbursement stands at about 59%, with the disbursement rate for BOP and AIK from organizations whose aid includes a high proportion of aid for structural adjustments and humanitarian aid, at nearly 100%. However, the rate is still generally low in other areas, particularly for aid concerned with transportation, communication, agriculture, forestry, and fisheries,. This is because aid for these purposes has only increased relatively recently, and is offered over long periods of time. Considering Mongolia's stock of natural resources, its fund acquisition capabilities, and other such factors, improvements must be made to permit early disbursements in order to realize efficient and effective benefits from such aid (Table 2.5.2.3). Table 2.5.2.5 illustrates the present state of overseas aid projects currently underway in the field of agriculture.

Table 2.5.2.3 Assistance by Sector (Unit: 1,000 $)

Sector	No.	Committed	Disbursed	Ratio	Share	Unit cost
Balance of payment	19	168,972	151,136	89.4%	17.2%	8,893
Aid in kind	33	139,015	138,275	99.5%	14.1%	4,213
Agriculture	43	45,172	19,777	43.8%	4.6%	1,051
Management development	32	78,172	36,465	46.6%	7.9%	2,443
Education	30	44,851	24,320	54.2%	4.6%	1,495
Health/WID/social development	38	46,077	29,343	63.7%	4.7%	1,213
Transportation/communication	18	258,165	85,765	33.2%	26.2%	14,343
Energy	27	128,064	59,798	46.7%	13.0%	4,743
Industry	12	61,359	28,495	46.4%	6.2%	5,113
Others	12	14,706	10,425	70.9%	1.5%	1,226
Total	264	984,553	583,799	59.3%	100.0%	3,729

NUMBER OF PROJECT BY SECTOR



COMMITTED AMOUNT BY SECTOR
(1,000US$)

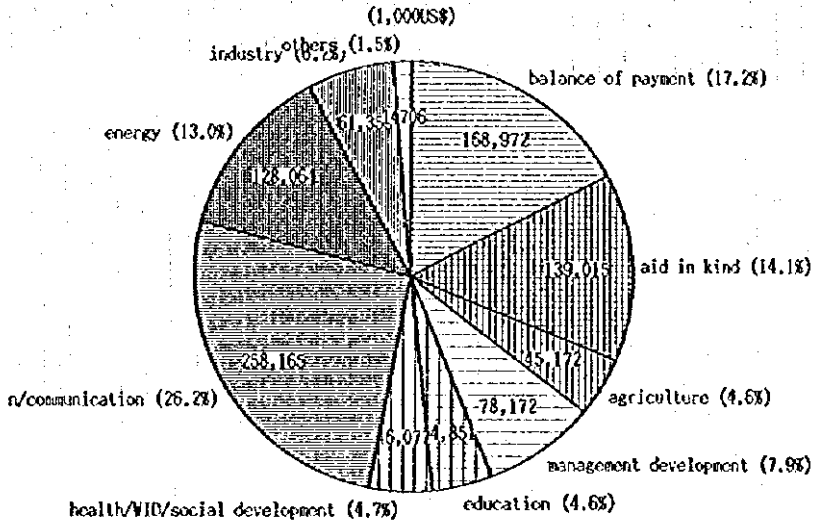


Table 2.5.2.4 Assistance by Donor (1,000US$)

Sector	No.	Committed	Disbursed	Ratio	Unit cost	Share
JAPAN	28	288,141	184,220	63.9%	10,291	29.3%
USA	7	75654	66,973	88.5%	10,808	7.7%
GERMANY	21	66,167	45,159	68.3%	3,151	6.7%
RUSSIA	1	38,750	35,439	91.5%	38,750	3.9%
DENMARK	31	25,449	9,971	39.2%	821	2.6%
FINLAND	2	9,900	9,900	100.0%	4,950	1.0%
HOLAND	7	9,015	4,588	50.9%	1,288	0.9%
CHINA	5	16,476	4,376	26.6%	3,295	1.7%
KOREA	9	7,630	3,980	52.2%	848	0.8%
ITALY	2	3,900	3,900	100.0%	1,950	0.4%
FRANCE	3	3,730	3,540	94.9%	1,243	0.4%
BRITISH	6	5,610	2,962	52.8%	935	0.6%
AUSTRALIA	8	4,668	2,824	60.5%	584	0.5%
TAIWAN	1	2,800	2,800	100.0%	2,800	0.3%
INDIA	3	1,700	600	35.3%	567	0.2%
SWEDEN	3	1,400	500	35.7%	467	0.1%
THAILAND	2	800	100	12.5%	400	0.1%
SUSTRIA	1	34	34	100.0%	34	0.0%
NORWAY	4	1,710	0	0.0%	428	0.2%
NEWZEELAND	3	435	0	0.0%	145	0.0%
ADB	44	186,571	68,213	36.6%	4,240	18.9%
IMF	2	86,680	52,600	60.7%	43,340	8.8%
WB	8	86,480	50,560	58.5%	10,810	8.8%
UNDP	18	14,468	11,069	76.5%	804	1.5%
WHO	2	9,751	7,651	78.5%	4,876	1.0%
UNEP	1	5,400	3,500	64.8%	5,400	0.5%
EU	9	16,933	3,208	18.9%	1,881	1.7%
UNICEF	6	3,791	2,060	54.3%	632	0.4%
IAEA	11	2,130	1,397	65.6%	194	0.2%
FAO	5	1,242	761	61.3%	248	0.1%
UNDESD	3	353	353	100.0%	118	0.0%
UNIFEM	1	220	165	75.0%	220	0.0%
ILO	1	135	48	35.6%	135	0.0%
UNEP	1	40	35	87.5%	40	0.0%
NDF	4	6,390	0	0.0%	1,598	0.6%
UNCTAD	1	0	0	-	0	0.0%
TOTAL(36)	264	984,553	583,486	59.3%	3,729	100.0%

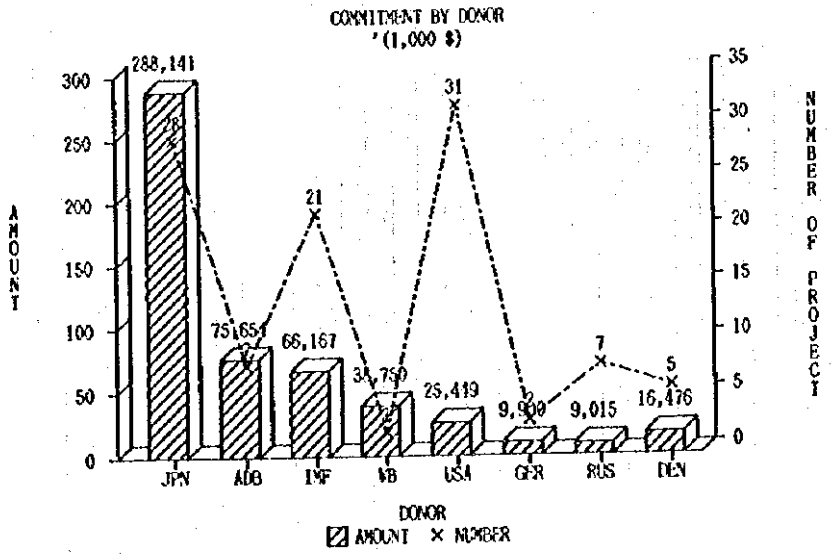


Table 2.5.2.5 Current External Assistance on Agriculture and Livestock Sector in Mongolia (Oct.,1994)

Project Title	Type	Donor	Commitment	Period	Main Contents of Assistance	Gov. Counterpart
1 Farm Management & Financing						
(1)Agricultural Management Dev. Project	TA	FAO	$296,316	94-95	Training farm management trainers on modern agricultural method	MOFA & MAU
(2)Agri. Sector Programme Loan	TA	ADB	$300,000	94	To develop an agenda of policy and institutional reforms and identify priority areas of investment in medum term	MOFA
(3)Management Dev. Assistance for Specific Key Economy Section	TA	UNDP,AIDAB	$874,000	92-95	Strengthening of management development capacity in the key economic sector and English education	IAMD,MAU,ESP
(4)Agricultural Development	CA	WB	$ 53,908	94	Soft loan for agricultural management?	MOFA
2 Livestock						
(1)Arkhangai Livestock Dev.Project	TA	IFAD		94-95	Formulation of Livestock Development Plan	MOFA
(2)Radio Immunoassary Technique in Animal Producton	TA	IAEA			Improving reproductive efficiency of dairy cattle	AHI
(3)Reorganization of the Dairy Sector	TA/C	DANIDA	DKK5,500	92-94	Trial on restructuring model of dairy farm management	MOFA
(4)Anti-Parasite Campain Project	AIK	Germany(GT	$1,129Th	92-94	Reducing the illness among the cattle using from Germany medicines	MOFA
(5)Northeast Asian Agricultural Cooperation & Support-Research & Technology Transfer	TA	FAO	$300,000	94-97	Maltilateral assistance to planned economy countries, Mongolia is leading country for livestock component.	MAU
(6)Livestock Genepool	TA	FAO	$163,000	94-95	Conseving of overall species of agriculture & livestock	AHI
3 Veterinary						
(1)Strengthening Veterinary Services in Mongolia	TA	EU	ECU2.4M1 ($300Th)	92-95	To establish veterinary epidemiological unit,a revolving credit fund,provide lab/equipment,English training etc.	MOFA
(2)Animal Diseases Project	TA	IAEA		93-95	To strengthen the national capacity for diagnosis and control of livestock diseases	VRI
4 Vegetable,Fodder,Fertilizer						
(1)Weed & Rodent Control	TA	FAO	$140,000	94-95	To strengthen the capacities for the feld	SPPS
(2)FADINAP Programme Jointly implemented FAO	TA	FAO,ESCAP, UNIDO			Natonal seminor on fertilizer distributon and marketing	MAU
(3)Improvement of Vegetable Production	TA	Israel		94	Pirot Project at the Devshil Green House by growing new types of tomatoes & cucubers	MOFA, PSARI

(4)Nuclesr Techniques in Agri.	TA	IAEA		93-95	To assist researchers to utilize isotope & nuclear techniques to increase agri. producton	PSARI
(5)World Bank Pro.on Improving the Crop Production	TA	WB		94-97	Increasing the crop production, preventng the soil from wind erosion & introducing the new technology in 5 crop farmers	MOFA
5 Food						
(1)Agri. Processing, Storage & Distribution Project	TA	FAO,ADB		93-94	Phase 2 study	MOFA
(2)Food Quality Control	TA	FAO	$190,000	93-94	To strengthen the food quality control system	SIHE
(3)Aid to Increase of Food Produc.	AIK	Japan	JP¥250Ml	95	KR2	MOFA
(4)Rehabili. of Refrigerating System of Darkhan Meat Plant	CA	Japan	$9.3Ml	94	Improving related equipments	MOFA
(5) -do- Ulaanbaatar Dairy Plant	CA	Japan	$8.8Ml	94	-do-	MOFA
6 Agri. Information / Marketing System						
(1)Strengthening the National Information Centre for Agri. Sciences & Techniques	TA	FAO	$126,000		To assist the Council of Agricultural Sciences of MOFA	MAU
(2)Strengthening Food and Agri. Marketing Reform in Asian Centrally Planned Economies	TA	FAO	$270,000	93-95	To strengthen & support food & agri.marketing reform through training	MOFA
(3)Agri. Statistics	TA	FAO	$308,000	93-94	To provide reliable statistics on food, agri. & livestock sector	SSO
7 Irrigation						
(1)Irrigation Rehabilitation Pro.	CA	FAO,ADB		92-94 (95)	Fact-finding study for loans	MOFA
8 Other						
(1)Master Plan of Integrated Agri. & Rural Dev. of Central Region	TA	Japan		94-95	Phase 2 study in 1995	MOFA
(2)Re-stocking of Cattle for Impoverished by Storms Herdsmen	AIK	Swedish Go	$ 51,000	94		SEC

Notoes:TA:Technical Assistance, CA:Capital Assistance, AIK:Aid in Kind, MAU:Mongolian Agricultural University, IAMD:Institute of Administration & Management Development, ESP:English for Special Purposes Institute, AHI:Animal Husbandry Institute, VRI:Veterinary Research Institute, PSARI:Plant Sciences & Agriculture Research Institute, SPPS:State Plant Protection Services, SIHI:State Inspectorate for Hygien & Epidemiology, SSO:State Statistic Office SEC:State Emergency Commission

Source:UNDP Agricultural Sectoral Experts Meeting, Oct.,1994,in Ulaanbaatar

4) Situation by Donor

Twenty countries and sixteen international organizations were providing aid to Mongolia at the end of 1995. Bilateral aid accounted for 57% of the total accumulative committed aid, with the remaining 43% provided as multilateral aid. The biggest donors were Japan and the ADB, with Japan providing 51% of the bilateral aid and the ADB contributing 44% of the multilateral aid.

Overall, most of the multilateral aid comes from three organizations, the ADB, IMF, and WB, while the bulk of the bilateral aid is provided by three countries, Japan, the U.S.A., and Germany. These six donors contribute more than 80% of all aid to Mongolia.

The average value of one aid package is $3.7 million, but the aid provided by the largest donors, Japan and the ADB, is unique; most aid from Japan is contributed to provide material support such as the rehabilitation of electric power generation plants and agricultural product processing facilities, or to provide food aid, and the average value of each aid package exceeds $10 million. But most ADB aid is provided to help with systemic reforms such as upgrading the government's organization and its administrative and management capabilities or with policy and system reorganization, or to help medium and small businesses. The average value of each ADB aid package is relatively small, at a little more than $4 million (Table 2.5.2.4).

These differences are natural consequences of the character of the ADB and the knowledge and know-how which Japan can provide. The best way to achieve the fast recovery of the Mongolian economy and the establishment of a market economy in the country is aid marked by overall harmony reflecting the characteristics of the donors which provide it.

2.5.3 Future Aid Concerns

1) Problems related to adjustment and supervision of aid

In the future, it is expected that BOP aid will decline in share while capital assistance and technical assistance, such as transfer of technology and management know-how, will increase. However, since Mongolia has little experience in the supervision of project assistance, it has been pointed out that in order to effectively supervise project assistance, Mongolia needs to take the following special measures to ensure the disbursement for project aid as required by the nation's need for development expenditures.

(1) Identifying the order of priority for government's development programs and the related foreign aid required for such programs

(2) Provision and effective utilization of counterpart resources (budget, personnel, etc.)

(3) Organizational, institutional and procedural Improvements, such as clear definition of the roles and the division of responsibilities between government's departments and agencies

(4) Securing of human resources and improvement of management capabilities

2) UNDP's Recommendations on Aid

The UNDP considers that the following measures will be required to ensure the effects of future aid in Mongolia.

(1) Coordination between Departments

Feasibility studies in many areas and projects in major sectors are currently under way and on the drawing board. Coordination between departments is important in promoting the supervision of these various types of aid and ensuring that the functions of departments complement each other. Therefore, the government should take necessary measures to promote the effective realization of these activities and goals.

(2) Ensuring Sustainability

In order to advance the sustainability of large-scale capital assistance, the need for the provision of technical assistance and reproduction expenses which supplement CA must be fully reviewed, and a systematic environmental impact assessment should be made on large-scale investment projects with due consideration to the fragile nature of Mongolia's ecological balance.

(3) Management capabilities

Mongolia's ability to absorb foreign aid depends on its human resources and management capabilities. Improved cooperation between organizations, increased efficiency in their joint efforts, and the cultivation and accumulation of qualified personnel in the public sector are important in approaching the issue of reorganization of the services in the private sector. Similarly, plans are also needed to enhance the management capabilities of personnel working for local governments, public and private enterprises.

CHAPTER 3 SITUATION OF THE STUDY AREA

3.1 Natural Conditions

3.1.1 Geographical Location and Population

1) Geographical Location

The Study Area is located in the middle of Mongolia at latitudes between 44. 2' to 50. 29'N. and longitudes between 101. 6' to 109. 3'E. Ulaanbaatar, which lies in the center of the Study Area at latitude 48. N. and longitude 107. E, happens to be in the same latitude as Munich (Germany) and Seattle (the U.S.), and in the same longitude as Hanoi (Vietnam).

Mongolia is made up of 21 Aimags (provinces) and one specially designated city (the capital city of Ulaanbaatar), of which six Aimags and the specially designated city are included in the Study Area. The Study Area has a total area of 235,000 square kilometers, and accounts for 15% of the total area of the country. The area of each Aimag and the city of Ulaanbaatar is shown in the table below.

Table 3.1.1.1 Area of the Six Aimags and One City in the Study Area

Name of Aimag/City	Number of Sum	Districts Area (km^2)
SELENGE	16	41119
DARKHAN UUL	4	3308
TOV	26	77389
BULGAN	8	1358
ORKHON	15	48733
OVORHANGAI	2	844
ULAANBAATAR	19	62895
TOTAL	90	235646

Note: The names of the Aimag and city in the Study Area are arranged in northeast to southeast and northwest to southwest order in four economic zones in this and other Tables in this Report.

2) Population

Mongolia has a total population of 2.25 million as of 1993, of which 1.13 million (50%) live in the Study Area. About 600,000 people (27% of the nation's total population) live in Ulaanbaatar, the capital of Mongolia, around 90,000 people (about 4%) in Darkhan (Darkhan-Uul Aimag), and 60,000 people (about 3%) in Erdenet (Orkhon Aimag). Thus, the combined population of these three largest cities accounts for approximately 33% of the total population of the country. The population trends in each aimag and city located in the Study Area is shown in the following Table.

Table 3.1.1.2 Population Trends in the Six Aimags and One City of the Study Area

(Units ten thousands of people)

Name of Aimag/City	1970	1980	1990	1993
SELENGE	5	7	8	9
DARKHAN UUL	2	5	9	9
TOV	7	8	11	11
BULGAN	27	40	58	60
ORKHON	4	4	6	6
OVORHANGAI	-	3	6	6
ULAANBAATAR	7	9	10	11
TOTAL	52	76	109	113
ENTIRE COUNTRY	127	168	215	225

3.1.2 Climate

1) Precipitation, Rainy Days, Humidity and Amount of Evaporation

The average annual precipitation in Mongolia is 218.5 mm (Table 3.1.2.1). The average annual rainfall in the Study Area, which ranges from 132.1 mm registered in Bogd in Ovorhangai Aimag to 340.7 mm recorded in Bulgan in Bulgan Aimag, averages out at 289.3 mm, about 30% higher than the national average (Table 3.1.2.2). Some 90% of the annual precipitation is registered during the crop cultivation period from May to September. The precipitation registered during this period ranges from 108.4 mm in Bogd to 305.7 mm in Bulgan (Table 3.1.2.3).

According to the precipitation data during the crop cultivation period or growing season over the past 30 years, the non-exceeding probability precipitation of 1/10 ranges from

145.4 mm registered in Ulaanbaatar in 1989 to 217.2 mm registered in Bulgan in Bulgan Aimag in 1981. The number of rainy days during the growing season (153 days on average) ranges from 40 to 74 days, averaging out to 59 days. Although the Study Area has many rainy days, its average daily rainfall stood at as low as 4.4 mm. This average daily rainfall is so little that most of the rainfall is considered to have no effects on crops.

The relative humidity during the crop cultivation period registered 61.7% on average. However, the estimated amount of evaporation in the area ranges from 320 to 930 mm, and averages out to 600 mm, which far exceeds the amount of precipitation for the same area. This indicates that the water holding capacity of the soil and draft resistance of crops will place considerable restrictions on crop production in Mongolia.

2) Temperatures and Hours of Sunlight

In the Study Area, the average monthly temperature from November to March is below 0. C, averaging around –25. C in January with lows often falling below –40. C. The average temperature during the growing season ranges from 14.3 to 8.3. C and is relatively low for the cultivation of crops. The average monthly maximum temperature ranges from 24.0 to 28.2. C while the temperatures during the period, excluding temperatures below 0. C, total to 1,979-2,195. C. It should also be noted that, although the average monthly minimum temperature ranges from -0.8. C to 3.5. C, the fact that sub-zero temperatures have been registered in May and September specifically indicates that the Study Area is subject to cold damage as well as early or late frost and snow damage. The wide difference between monthly high and low temperatures, sometimes fluctuating as much as 30. C in one day, is another factor which adversely affects crop cultivation and production.

The area receives 1,339 hours of sunlight on average (1,407 ~ 1,296 hours) during the growing season. This duration of sunshine is sufficient for growth of crops.

3) Wind Direction and Wind Velocity

Although the proportion of annual wind direction varies from area to area, mainly from the north (N) and northwesterly (NW) winds predominate in the Study Area on the whole. The average wind velocity from April to October ranges from 1.3 to 4.2 m/s (Table 3.1.2.4). Strong winds blow in April and May, and the maximum monthly

average wind velocity is 5.1 m/s registered in Arvaiheer (Ovorhangai Aimag) and Maanit (Tov Aimag). Strong winds and soil erosion which occur during tillage and seeding in early spring act as constraints on crop production.

3.1.3 Hydrology

1) Rivers

(1) Outline of the River System

The principal river in the northern part of the Study Area is the Selenge River system which has a total of 750 main streams and tributaries. The drainage basin of the Selenge River covers a 175,000 Km^2 area which is about 11% of the total area of Mongolia. Being located in the part of Mongolia which has a relatively large amount of rainfall, the river has a considerable volume of flowing water, and discharges 75 billion m^3 of water, accounting for 23% of the total surface run-off in Mongolia. There are 220 rivers in the southern part of the Study Area, but rainfall is scarce and the volume of flow of these rivers is small.

(2) Run-off Discharge

All rivers in Mongolia freeze from about November to the middle of April, and are covered with ice which is about 80 to 120 cm thick. The flow of rivers generally increases from the latter part of April to May when thawing starts. A look at monthly changes in flow rate using annual mean flow data collected by flow observatories provided in the Study Area over a twenty-year period from 1973 to 1992 shows that, in general, the flow starts to increase from the thawing period in April, reaches a peak in July to August due to the effects of localized concentrated rain which hits the area from June to August, and then gradually decreases.

(3) Flood Discharge and Droughty Water Discharge

A study of flood discharge and droughty water discharge based on a 1/10 probability calculation shows that a flood discharge of 662.2 m^3/s and a droughty water discharge of 274.9 m^3/s were registered in Zuunbren located down the Selenge River in 1985 and 1981, respectively, while a flood discharge of 126.6 m^3/s and a droughty water discharge of 30.9 m^3/s were registered in Ulaanbaatar on the Tuul River in 1973 and 1989, respectively.

2) Water Resources

(1) Water Reserves

Of the annual mean domestic precipitation of 218.5 mm, 90% is lost through evaporation, and the remaining 10% constitutes the total annual run-off (surface run-off + ground water) of 38.9 billion m^3 (Table 3.1.3.1).

Surface run-off accounts for about 84% (32.8 billion m^3) of the total annual run-off, and the remaining 16% (6.1 billion m^3) is the amount of water that sinks into the ground. Some 50% of the water that percolates downward through the soil will eventually be discharged into rivers while the remaining 50% will become a source of ground water. The amount of surface run-off in the Study Area accounts for 26% (about 8.5 billion m^3) of the total for the nation, while some 25% (about 1.5 billion m^3) of the total ground water in Mongolia is located in the Study Area (Table 3.1.3.1).

(2) Water Consumption

In 1993, the Study Area accounted for 57% of the nation's total water consumption, consumed 71% of the total amount of water used for living nationwide, and of the total amount of water used for industrial purposes, as much as 84% is consumed in the Study Area. This is because the country's population and industries are concentrated in the Study Area.

Although the nation's consumption of water started to increase in the 1980s and continued to increase up to 1990, it began to decrease after the transition to a market economy due to the scaling-down of business operations and an increase in the number of idle irrigation facilities. Only 0.7 billion m^3 of water, accounting for 1.8% of the total annual run-off, was consumed in 1990 while a mere 0.5 billion m^3 of water, or 1.3% of the total annual run-off, was used in 1993.

(3) Water Quality

The good quality of ground water and surface water in Mongolia has been recognized throughout the world. However, it is pointed out that the rivers are becoming polluted due to an increase in the amount of domestic waste being generated as a result of the rapid urbanization which continued up to 1990, an increase in the amount of sewage and waste water as a result of industrialization, and an increase in the number of domestic animals. A survey of water quality was therefore conducted at 301 places within the Study Area. The findings of the survey are described below.

a) Drinking water

Of 215 samples tested, 161 samples were classified as consisting of water suitable for drinking, 30 as water which people can drink if boiled, 7 as water which can be used as drinking water for livestock, and 17 as water not suitable for either of them (a large content of iron, excessively hard). On the whole, 89% of the samples taken can be used as drinking water for people, and 92% of them can be used as drinking water for livestock.

b) Irrigation water

All the samples fit for irrigation use with respect to F/C (Electric Condactivity) Although ten samples had pH levels which exceeded 8.0, they could be used for irrigation without any specific problems.

3.1.4 Topography and Soils

1) Topography

The Study Area is located in the central part of Mongolia, with the Henti mountains to the east, the Hangai mountains to the west, Lake Baikal to the north and the Gobi desert to the south. The Henti mountains stretch northeastwards from Tov Aimag and include 2,000-meter mountains. The Hangai mountains extend 700 km northwestwards from Ovorhangai Aimag The leading peaks in the mountains reach a level of 3,000-meters, with the highest of them reaching as high as 4,031 meters with its top covered with glaciers.

The land rises gently towards the south from its lowest point (six hundred and several tens of meters) in the vicinity of Suhkbaatar, reaching a height around the 1,300-meter level in Ulaanbaatar located in the central part of the Study Area and around the 1,800-meter level in Arvaikheer (Ovorhangai Aimag), before leading into a plain terrain which resembles desert. Outside the mountainous zones, mountains in the area feature repeated undulations with gently sloping contours, and form broad basin-like plains from the mountains to the foothills. The plains gradually get broader in the south of the central part of this area, and extend endlessly in the south of Ovorhangai Aimag.

2) Soils

(1) General description of soils distributed in the Study Area

The table below (Table 3.1.4.1) shows a list of the soils seen in the Study Area (235,000 km^2). This table was prepared on the basis of 1:3,000,000 soil maps published by the Science Academy of the Mongolian People's Republic in 1990 and the findings of field studies conducted by the study team working in the Study Area.

Soil in Mongolia is written in Chapter 3.1.4.1 in the supplementary materials by citing Information MONGOLIA, 1990.

Table 3.1.4.1 Land Zones in the Central Part of Mongolia and Soil Classifications

Land Zone	Soils classified by the Science Academy of the Mongolian People's Republic	Soil Classification by FAO
Coniferous forest zone in high mountain	Lithic frozen soil of the coniferous forest zone (Г т ж^{м}, Г т ж Л) Mountain grassland soil (Г л, Г л с) Tundra soil (Г т) Plain frozen soil(Г т) Frozen soil (П л)	Lithosoils (associated with Greyzems and Kastanosems)
Forest zone and plain zone	Frozen soil (Г л л) Black soil (Г ч Б к) Fine calcificated black soil (Г ч, Ч) Unused grassland soil (Л г ^{оС})	Lithosoils (associated with Kastanoseims) Luvic Kastanosems
Dried plain and wilderness zone	Fine calcificated black brown soil (К з) Fine calcificated shallow black brown soil ($К_3^1$) Non-calcificated shallow black brown soil ($К_3^1$) Fine calcificated brown soil (Г К2, К2) Fine calcificated shallow brown soil ($К_2$) Fine saline brown soil ($К2^{сл}$) Fine calcificated bright brown soil (Г К1, К1) Fine calcificated plain brown soil (К л) fine calcificated plain brown soil (К л ^{оС}) Fine saline brown soil (К л ^{сл})	Luvic Kastanosems Luvic Kastanosems
Semi-desert and desert soil	Plain gray desert soil (Г с б2, С б2) plan gray saline desert soil (С б $^{2с\,м}$) Desert soil of wasteland (С б1)	Luvic Xerosols Haplic Yermosols
Saline soil and marsh soil	Saline soil (С н) Frozen marshes soil (Б^{м})	

(2) Characteristics of arable land soils

A total of 344 soil samples were taken from the surface of the arable land on 41 farms selected in the Study Area. A scientific analysis was performed on the samples by an organization to which the task was commissioned.

Soil sampling sites are shown in Table 3.1.4.3 and fig. 3.1.4.3 and characteristics of the soil in the Study Area is shown in Table 3.1.4.2 in the supplementary materials.

Soils sampled from each farm were classified either as the above-mentioned fine calcificated black brown soil or as fine calcificated brown soil. Both of these soils correspond to FAO's Kastanosems. In terms of the chemical properties of the soils, a relatively large number of the soil samples lack nitrogen and phosphoric acid. Otherwise, there are no significant restrictive factors that would affect crop production. An item-by-item summary is given in the following discussion.

[1] pH values in soils (H_2O)

The pH values of the soils indicate that most of the soils are slightly acidic, and the soils are judged proper for growing crops.

[2] Content of organic matter

According the Mongolian classification system which defines soils containing more than 2.5% organic matter as Class I soils, soils containing 1.1%-2.5% as Class II and soils containing less than 1.1% as Class III soils, respectively, most of the soils (70% of all the sites analyzed) fall under Class II or III, and cannot be considered to have a large content of organic matter. This tendency is particularly noticeable in Tov, Bulgan and Darkhan-uul Aimags.

[3] Content of nitrates (NO_3)

At 60% of all the sites analyzed, the soils were found to be lacking in NO_3 based on the reference value which Mongolia uses as the criteria to determine the normal content of NO_3. In particular, soils in Ovorhangai Aimag, where sandy soils and loam-type soils are found in abundance, contain low levels of NO_3.

[4] Content of available phosphoric acid (P_2O_5)

At 40% of all the sites analyzed, soils were found to have insufficient amounts of phosphoric acid. Ovorhangai Aimag, in particular, has a large amount of soils lacking in P_2O_5.

[5] Content of exchangeable potassium (K_2O)

Most of the soils have a sufficient content of K_2O as well as exchangeable magnesium (MgO).

[6] Water soluble salts

Most of the soils registered zero content. It is assumed from this result that there will no problem regarding salt accumulation in arable land soils.

3.2 Environment

1) Present situation in the Study Area

Most of the Study Area, with an exception of urban areas including the city of Ulaanbaatar, is a sparsely populated area in which much of nature remains intact and where a number of rare and endangered wild animals and plants are living.

The confusion which has resulted from the drastic shift from a planned economy to a market economy has affected the administrative handling of the environmental matters, particularly with regard to the handling of the natural environment at the local level. The system for supervising and monitoring the protection of the natural environment has weakened in Aimag and Sum due to reductions in administrative budgets. Because of this, the number of violators who cut down trees in forests without any care or planning for the consequences or hunt wild animals without obtaining permission is increasing. The various types of animals and plants described below are particularly in need of protection.

(1) Forests

The Study Area has a total area of 3.53 million ha of forests which contain a variety of tree species such as larch, cedar, pine, white birch, fir and poplar trees. Most of the trees felled in those forests every year to produce lumber are used in industry, but artificial reforestation covers only 30% of the cutover area, and the remaining areas are left to natural rejuvenation. In addition to the depletion of the forests through such deforestation, frequent forest fires and insect damage are also taking their toll.

(2) Conservation zones for rare animals and plants and wildlife

Mongolia has listed a number of animal and plant species which are rare and in danger of extinction (7 species of animals, 6 species of birds, 4 species of reptiles, 2 species of amphibians, 2 species of fishes and 17 species of plants) as well as those which are listed as species in peril of extinction (16 species of animals, 13 species of birds and 21 species of plants) (see Table 3.2.1). Major threats to wild animals and plants living in

Mongolia include destruction of their habitats (deforestation, transformation of grasslands, devastation of land through grazing, cultivation, development of infrastructure, amongst others), eradication of predators in order to protect indigenous animals, unlawful hunting by tourists, and crossbreeding of domestic and wild animals. Many parts of Mongolia and their ecosystems thus making them important have unique features and are valuable as habitats for rare and characteristic species native to the country as preservation areas for many forms of plants and animals. The government of Mongolia has consequently designated 23 places as wildlife preserves or a national parks, covering a total area of 10 million ha.

The Study Area has a total of seven preserves and national parks with a total area of 1.56 million ha, which accounts for about 7% of the total Study Area. The Han Hentei mountain range (located in the upper reaches of the Honon River, Herlen River and Tuul River), in particular, includes a number of biologically unique areas (see Tables 3.2.2.1-2).

2) Present status of environmental preservation

(1) Laws related to environmental preservation

The public took a growing interest in the preservation of nature and environment during the middle of the 1970s, and voluntary environmental preservation groups were organized. Campaigns concerned with preserving the natural environment were carried out by people including leading members of the government and the People's Revolutionary Party. A brief description of the actions government has taken so far regarding the preservation of the environment as well as related laws is given below.

Three laws, the Forest Law, the Hunting Law and the Water Resources Law, were enacted in 1974, and the Air Pollution Prevention Law as well as the Law Related to the Development of Mines and Mineral Resources were enacted in 1989. Until then, each different competent authority separately administered environmental preservation issues, with no unified policy regarding environmental issues in evidence. Therefore, the Ministry of Environmental Preservation was established in 1987. In the wake of political and economic reforms which began in 1990, this body was subsequently reorganized as the Environmental Preservation Committee, which was under the direct control of the Cabinet, to promote environmental policies. It was then changed to the Ministry of Nature and the Environment in 1992. The organization of the Ministry of Nature and the Environment is shown in Figure 3.2.1.

The Ministry of Nature and the Environment is in charge of forest management, policies regarding water resources, land use programs, authorization of hunting, meteorology and policies concerning the preservation of nature. Its basic administrative policies are as follows:

[1] To make economic evaluation of natural resources, and increase the value of natural resources;

[2] To apply the findings of scientific research to environmental monitoring and assessment;

[3] To develop and enhance laws concerned with the preservation of nature and the environment; and

[4] To supervise the protection of natural reserves.

At the local government level, every Aimag and specially designated cities have an Agriculture and Environment Bureau, where a senior nature preservation supervisor and nature protection inspectors are assigned to take charge of plans regarding the use of forest resources, particularly minimizing the effects of deforestation, and issuance of hunting permits under the supervision of the Director of the Environment. In Sum the protection of the natural environment is promoted through the assignment of inspectors and other measures.

The laws enacted thus so far date back to the 1970s, and are have already become outdated to a large extent.

Thus, new laws were promulgated in 1995, which covered the following twelve areas concerned with the environment.

[1] Protection of the Natural Environment, [] Air, [3] Animals and Plants, [4] Land, [5] Reserves, [6] Hunting [7] Chemical Toxic Matter, [8] Forests, [9] Water, [10] Modification to reserves, [11] Underground Resources, and [12] revisions to these laws.

(2) Environmental Impact Assessment

The Natural Environment Protection Law stipulates that the Ministry of Nature and the Environment should carry out environmental impact assessments (EIA) as necessary. EIAs have already been carried out for several projects. Mongolia has not established its own procedures for environmental assessments so far, but the Ministry of Nature and

the Environment promulgated "Regulations and Related Guidelines for Evaluating the Impact of Programs on the Environment" in 1995. The Ministry developed the regulations after studying the EIA checklists used by the Asian Development Bank (ADB), the UN Asia-Pacific Socio-Economic Committee (ESCAP) and the World Bank (WB).

EIAs have been carried out on both a large or small scale for various projects thus far. An EIA carried out for the Egiyn Gol Hydrothermal Power Station Project implemented in Bulgan Aimag can be cited as an example of a large-scale EIA while the EIA performed regarding gold mind development in Samur Sum, Tov Aimag can be cited as an example of a small- medium-scale EIA.

3) Problems to be solved in environmental preservation policies

The promulgation of the laws related to the environment to a large extent completed the task of making legislative improvements in the natural protection policies of the nation. However, as Mongolia is confronted with a severe shortage of budgetary and human resources, it will have difficulty in performing the tasks required by its own laws. Therefore, it is urgently necessary that the country be able to secure adequate as well as stable sources of revenue and expand organizations.

3.3 Agricultural Policies

Major agricultural polices laid out by the Mongolian government after the transition to a market economy are reviewed and summarized below.

3.3.1 Action Program of the Government of MONGOLIA

An Action Program was approved by the Great National Congress in October 1992. This program sets forth a broad range of action programs to be implemented for achieving the basic national goals and targets of Mongolia by 1996. In this program, the development policies for the entire nation are laid out, including "Macro Economic Policies," "Production, Science and Technological Policy," "Social Development Goals," "Environmental Protection," "Policy of Improving Governance," and "Foreign Relations." The main point of the agricultural policy and development goals given in the section "Production, Science and Technological Policy" can be summarized as follows.

(1) The state will exempt enterprises from taxation when they contribute to the food supply.

(2) Annual targets for the consumption of agricultural products per capita have been set as follows: 90 kg for meat and meat products, 100 kg for dairy products, 110 kg for wheat flour and wheat flour products, and 50 kg for vegetables. Various technologies for increasing production of agricultural and livestock products are to be introduced and developed in order to more effectively address the problem of shortages of food supplies.
(3) The government is to provide support for the construction of small- and medium-scale sugar-refining and oil-refining plants. The target set by the government calls for the nation to supply 50% of the demand for sugar and 30% of the demand for vegetable oil from domestic production by 1996.

However, commenting on the feasibility of the program with particular regard to sugar beet production to meet sugar production goals, a recent FAO/ADB report raised doubts concerning meeting this goal stating that "the (FAO/ADB Study) Mission does not believe that sugar beet constitutes a promising opportunity for the future, as it raises major technical, financial, economic and logistic issues" in its "Irrigation Rehabilitation Project" report presented to the government of Mongolia in 1994.

3.3.2 National Programme on the Population's Food Supply Improvement

This program was formulated to improve the supply of food for the Mongolian people in accordance with the "World Nutrition Declaration" and "Action Plan on Nutrition" adopted during the International Nutrition Conference held in Rome in December 1992. The program was approved in a Cabinet meeting in April 1994.
Under the plan, the amount of energy required to live under the natural conditions of Mongolia was set at 3,136 kilo calories per capita a day, and the population growth rate was set at 2.5%. Those parameters were used to determine the demand for 12 main types of foods in 1995 and 2000, and various measures for meeting the demand were studied.

Table 3.3.2.1 Staple Foods Supply Plan

Food	Physiological standard required a year (kg/man)	Gross Supply Quantity	
		1995 (Thou. Tons)	2000 (Thou. Tons)
Meat, Meat Products	92.5	240	265
Milk, Milk Products	270	640	700
Butter	7	16.7	18.6
Wheat, Flour Products	114	270	300
Potato	65	160	350
Vegetable	66	160	350
Egg (Unit: Pieces)	50	120 (million)	130 (million)
Vegetable Oil	7	16	18
Rice	20	48	53
Fruit	35	83.3	93
Sugar	25	60	66
Fish, Fish Products	1.3	3.1	3.5

Source: National Programme on the Population's Food Supply Improvement

The programme was principally based on the "World Nutrition Declaration" and the "Action plan for Nutrition". Taking into consideration the fgigures in the Programme, the targetted figures of the year 2010 for ther Master Plan was fixed through discussion with the Mongolian counterpart personnel.

3.3.3 Basic Government Guidelines on Rural Development

Basic government guidelines regarding rural development were laid out by the Ministry of Food and Agriculture, presented to the Great National Congress in June 1995, and are currently under deliberation. These are basic guidelines aimed at promoting agricultural and rural development targeted for five to ten years. The guidelines list the following items as priority themes to work on.

[1] When "the Master Plan Study " is completed and the Plan is put into effect, the six Aimags and one city covered by the Plan shall give thorough consideration to the following matters.

-Renovation of agricultural technology

-Increasing the numbers of quality livestock

-Establishment of production farms for superior seeds

-Processing of agricultural and livestock products

-Development of small- and medium-scale plants

[2] Grain production farms and flour milling plants are to be reconstructed.

[3] Services and research institutes that support agriculture and livestock industry are to be established.

[4] An agricultural development fund is to be set up and utilized effectively to address the problem of poverty in rural districts and provide opportunities for people who are capable of raising livestock to engage in livestock farming.

[5] The development of infrastructure at regional level is to be started through mutual cooperation among Aimags. In addition, better education and medical services are to be provided in rural districts.

[6] Problems which may arise after the enforcement of the Land Law, such as land use fees, are to be examined. The systems for supervising the use of water and forest resources are to be unified into one comprehensive system.

[7] Measures are to be taken to support the private sector as regards innovations in food production technologies and food production, as well as increase the number of export products and produce domestically a greater share of product, currently imported into the country.

3.4 Foundation of Agricultural Economy

3.4.1. Land use

1) Present state of land use

The present state of land use is shown in the following table.

Table 3.4.1.1 Present Land Use

(Unit:1000ha)

	Selenge & Darkhan-Uul	Tov and Ulaanbaatar	Bulgan & Orkhon	Ovorhangai	Total
Arable land	335	300	111	41	787
Grass land	2,383	6,515	3,771	5,947	18606
Forest area	1,647	831	952	97	3,527
Urban & Industrial area	52	53	83	22	210
Natural Environment Protection area	(28)	(1,103)	(2)	(20)	(1,153)
Other area	26	186	40	183	435
Total	4,443	7,875	4,957	6,290	23,565

Note: The natural environment protection areas are included in other land use areas.

2) Present state of land use by Aimag

(Selenge and Darkhan-Uul Aimags

These Aimags are rich in water resources with such large rivers as the Selenge River and the Orkhon River running through the Aimags. The areas along the rivers consist of broad dry riverbeds and gently sloped hills, where large-scale farming land is concentrated. While most of the area in this region encompassing Selenge and Darkhan-Uul Aimags consists of grassland used for grazing, the ratio of the land area covered with grass to the total land area is lower than that for other regions. Many of the places where grass grows thickly in abundance are located near the forests in the mountains. This region is characterized by forests distributed in hill, which account for 37% (1,647,000 ha) of the total area of the Aimags. Many places rich in luxuriant vegetation of forests are widely spread in the eastern and northwestern parts of the region. Arable land area accounts for 8% (335,000 ha) of the total area in the region.

(Tov Aimag and Ulaanbaatar city)

In Tov Aimag and Ulaanbaatar city, grasslands comprise 83% (6,505,000 ha) of the total land area, while forests and arable land account for 11% (831,000 ha) and 4% (300,000 ha), respectively. This region has a comparatively large area of arable land in the Study Area, and can be roughly divided into two sections with the boundary between the two formed by the Tuul River: the northern section with relatively many rolling plains and a large amount of arable land, and the southern section consisting mostly of grassland which is used simply for pasturage. Mountains and hills lie to the north of the Tuul River, where forests are distributed. Forests with thick vegetation are distributed in the vicinity of the boundary between Tov and Selenge Aimags. To the northwest of Ulaanbaatar city lies large-scale tracts of arable land which extend from Selenge Aimag.

(Bulgan and Orkhon Aimags)

Grassland accounts for 76% (3,771,000 ha) of the total land area, followed by forests. Mountainous areas lie in the northern part of this region while a mountainous district with mountains lower than those in the north lie in the south. Forests are distributed on the northern slope of the mountainous district. Some swamp-like land covered with grass is located in the southern part of this region along the Uul River, and arable land is distributed around this area. The region has a small area of arable land (111,000 ha), comprising only about 2% of the total area of this region.

(Ovorhangai Aimag)

Some 5,947,000 ha, or 95% of the total area, of Ovorhangai Aimag consists of grassland giving it a higher ratio of grassland to the total area than any other region in the Study Area.

The second largest type of land is other areas, which account for 3% of the total area of this region. Large-scale arable land can be seen in the northern part of the region, but it comprises a smaller area compared with arable land in other Aimags. Forests are distributed over a part of mountainous districts located in the northwest.

3.4.2 Agricultural Production

1) Crop production trends

The Study Area has a cultivated land area of 787,000 ha, which accounts for 65% of the nation's total cultivated land area of 1,203,000 ha, making the area of a main crop production center. The area under cultivation for wheat, potatoes, vegetables or forage crops totaled 418,000 ha in 1993, while about half of the cultivated land lay fallow.

(1) Area under cultivation

The staple crop is wheat, and the area under cultivation for wheat accounts for 73% of the nation's total area under cultivation, or 87% of the total area under cultivation in the Study Area. Thus, wheat is the most important crop in this country. With the exception of fruits and soilage (grasses of various types), approximately 70% or so of the crops produced in Mongolia are raised in the Study Area. Based on this, it is safe to say that this region is specialized in production of crops.

Table 3.4.2.1 Area of Cultivated land and area under cultivation (1993)

(Unit:Thousand of ha, %)

Aimag	Mongolian Total	Selenge & Darkhan-Uul	Tov & Ulaanbaatal	Bulgan & Orkhon	Ovorhangai	Study Area Total	Ratio of Study Area
Arable land	1,203	335	300	111	41	787	65.4
Planted area	584.8	189.7	145.3	64.1	19.2	418.3	71.5
Cereals Total	546.4	184.1	130.7	62.8	16.3	393.9	72.1
Wheat	498.1	182.7	106.8	57.7	14.7	361.5	72.6
Potato	8.87	1.08	3.40	0.58	0.23	6.29	70.8
Vegetables	3.12	0.65	1.30	0.18	0.05	2.18	69.8
Fruits	0.48	0.12	0.06	0.00	0.00	0.18	37.5
Fodder crop	26.9	2.6	10.4	0.9	2.7	16.6	61.7
Silaging crop	11.2	2.2	8.3	0.6	0.0	11.1	99.1
Soiling crop	15.7	0.4	2.1	0.3	2.7	5.5	35.0

SOURCE: MOFA, MONGOLIAN ECONOMY AND SOCIETY IN 1993

Principal vegetables include cabbages, turnips, carrots, onions and green onions. In addition to these vegetables, cucumbers, tomatoes and garlic are also cultivated.

All most fruits and vegetables, and a limited amount of wheat, potatoes and forage crops are under irrigation.

The planted acreage for the above-mentioned crops with the exception of vegetables has been decreasing since 1992. This trend is particularly noticeable for forage crops. A review of the trend of yield shows that yield per hectare was relatively stable up to 1989 but decreased sharply afterwards.

(2) Output

Output of farm products decreased by 40% throughout the entire nation as well as in the Study Area due to a decrease in the planted acreage and a drop in yield per hectare. However, the Study Area still remains the most important district for crop cultivation since more than 70% of wheat and vegetables grown are produced in this area.

Table 3.4.2.2 Output of Main Farm Products

(Unit:Thousand of tons, %)

Aimag	Mongolian Total	Selenge & Darkhan-Uul	Tov & Ulaanbaatal	Bulgan & Orkhon	Ovorhangai	Study Area Total	Ratio of Study Area
Cereals Total	479.5	166.9	109.0	61.4	15.3	352.6	73.5
Wheat	450.2	166.9	95.2	57.2	14.0	333.0	74.0
Potato	60.1	15.4	24.6	4.7	1.9	46.6	77.5
Vegetables	22.7	6.4	10.1	1.2	0.3	18.3	80.3
Fruits	0.25	0.01	0.00	0.00	0.00	0.02	7.3
Fodder crop	99.7	13.1	55.4	6.0	3.2	77.7	78.3
Silaging crop	69.9	12.1	50.6	5.7	0.0	68.4	97.9
Soiling crop	29.3	1.0	4.8	0.3	3.2	9.3	31.7

Source: MOFA, Mongolian Economy and Society in 1993

2) Present state of irrigation schemes

Surveys were conducted in the Study Area by the Ministry of Food and Agriculture in 1982, covering 313 schemes covering an area of about 165,900 ha. Of these scheme, 246 schemes covering a total area of 110,500 ha were registered as feasible for irrigation. The number and area of the schemes in which irrigation facilities were constructed are 108 schemes and 26,700 ha, respectively. In addition, irrigation facilities have been constructed in recent years in 24 unsurveyed systems covering a total area of 532 ha. 13,861 ha was cultivated as of 1993, and was 51% of the schemes in which irrigation facilities (mechanical and gravity irrigation systems) were constructed. Fallow land has been expanding among the schemes year by year because the function of the facilities has dropped due to inadequate maintenance and no rehabilitation nor improvement has been executed due to inadequate budget. These data for each Aimag are shown in the table 3.4.2.3.

Figure 3.4.2.1 to 3.4.2.4 contained in Annex indicate the location of each scheme.
More detailed information is also given in Supplementary materials.

3) Soil erosion in cultivated land

Cultivated land, which is the foundation of agricultural production, is undergoing erosion due to strong wind as well as strong localized rainfall.

A soil loss survey was conducted by the Land Policy Research Institute of the Ministry of Nature and the Environment over a three-year period from 1989 to 1991. Of the total cultivated land area of 1,206,400 ha, 914,100 ha was analyzed.

The extent of soil loss is determined by comparing the soil from cultivated land and soil from uncultivated land near the cultivated land. Soil loss is then rated as being small, medium or large for each soil characteristic (thickness of surface soil, fertility level, clay content and the like).

Extent of soil erosion and survey results (for the surveyed area, see Table 3.4.2.4)

Table 3.4.2.4 Measures of Degree of Soil Loss and Survey Results

Degree of loss / Specific of soil	Degree of soil loss			
	Small	Medium	Large	Total
Thickness of surface soil	5 – 25%	25 – 50%	50%<	
Content of fertile soil	5 – 15%	15 – 40%	40%<	
Content of clay	2 – 7%	7 – 12%	12%<	
Soil loss area (thousand ha)	330.7 (58.9%)	330.7 (58.9%)	72.4 (12.9%)	561.5 (100%)

According to the results of this survey, a land area of 561,500 ha or about 50% of the area of cultivated land has been eroded nationwide, of which, more than 40% is rated as having suffered from medium or large scale erosion. Of the total cultivated land area of 787,000 ha in the Study Area, 398,100 ha of land, or 52.3% of the total, has been eroded, though the degree of soil varies from place to place.

4) Main crops under cultivation

Area of growing land and unit yield of main crops are shown in Table 4.3.2.2 on the supplementary materials. And outline of cultivation methods of main crops in shown in Table in the Annex.

(1) Cereals

Cereals under cultivation include wheat, barley, oats and rye. Output ratios in the Study Area are 97% for wheat, 2% for barley, and 1% for oats and rye combined. Output ratios for the entire nation are about the same as those figures. This means that wheat accounts for virtually all the cereal grains produced in Mongolia.

(2) Potatoes

Early Mongolia, seed potatoes imported from the former Soviet Union and East Germany were used for domestic production of potato crops. In addition, the certified potato seeds produced in PSARI were used after they were multiplied in an isolation field for one to two years. In 1993 PSARI started its effort to produce virus free microtubers through the application of a growing point culture method, instead of applying the "klon" method. Sufficient amount of seed potatoes are unable to produce due to a lack or shortage of glass house for multiplication. Of these, 40% rot as they freeze or are damaged by diseases in the process of storage of seed potatoes. This is

another factor that contributes to the shortage of seed potatoes. For this reason, many of the seed potatoes are grown on individual farms, which has resulted in a deterioration in the varieties produced, and a decrease in actual production.

(3) Vegetables

Vegetables under cultivation, in order of output in 1994, beginning with the largest, are cabbages, turnips, carrots, onions, cucumbers, tomatoes, watermelons, melons and garlic. Most of the vegetables are grown in open fields using irrigation, but cucumbers and tomatoes are raised in glass and plastic green houses. In addition, cucumbers and tomatoes intended mainly for processing into other products are grown in open fields. Vegetables and potatoes are also produced in fenced-off family gardens (crop/plots for home use), but this a special form of production. Vegetables of various types are offer cultivated within fenced-off areas. Allium crops include onions, green onions, garlic and leeks. The cultivation area for garlic does not increase despite large demand because of difficulty in breeding bulbs and the small yield of this crop.

(4) Fruit trees

There are sixty kinds of fruit trees in Mongolia, including those that grow naturally. Historically, nomadic tribes have made use of native fruit trees. Mongolia started to study growing of fruits in the 1940s, but the species of fruit trees they can grow are limited at present.

Major fruits grown in the Study Area include UHRIN NUD (Ribes rubrum), CHATTURGANA (Hippophaë rhamnoides) and BESREG ALIM (Malus spp.), and improvements are going to be made to these three kinds of fruit trees in the future. CHATTURGANA fruit contains 8.5% oil and many vitamins.

Since fruit trees are subject to frost damage during their blooming season which lasts from mid May to early June, it is necessary to develop effective measures to deal with this problem when growing fruit trees. A lack of proper facilities for raising fruit seedlings and irrigation facilities has become a matter of much concern.

(5) Oil crops

The Mongolian people have tried to raise such oil crops as soybeans, sunflowers and rape seed, but efforts to raise soybeans have been discontinued because of low yield, lodging and poor marketability. Since sunflowers do not produce many seeds in

Mongolia, sunflower cultivation is not widely accepted nor practiced by the populace. Rape seed is the only oil crop currently grown in Mongolia, but not without problems. Insect damage and poor germination due to the drying of the soil during seeding are problems requiring much attention.

The experiments being carried out by PSARI to cultivate flax are making progress, and had a seed yield of 1t/ha. Flax is a prospective crop of much promise as its seeds yield oil, and a textile fiber can be obtained from its stems. The experiment data obtained thus far make it difficult, however, to determine which is more favorable, rape seed or flax.

(6) Sugar producing plants

One sugar crop which can be cultivated in Mongolia is sugar beet, which is currently undergoing experimental cultivation. The results of a six-year experiment by PSARI shows that sugar beet yields 20 to 26 t/ha of roots (it yielded 30 t in 1994) with a sugar content of 12 to 18%. Byskaya odnocemyamia-12 is one variety of sugar beet which shows particular promise.

Since sugar beet cannot be repeatedly cultivated in the same field, it is necessary to consider a suitable crop rotation system. In addition, cultivation of sugar beet requires irrigation, and application of fertilizer and agricultural chemicals will be needed in order to realize high yields. Sugar beet crops have been cultivated through direct planting at the "Ochir" farm in Zunhara Sum, Selenge Aimag since 1993.

(7) Forage crops

Oats, sunflowers and rape seed are mainly cultivated as forage crops in the Study Area. Other forage crops under cultivation include barley and corn. These are used for silage and as soilage. These forage crops are grown through single or mixed seeding. Lower quality grains of wheat and barley, wheat bran and hay are used as forage for farm animals.

5) Crop growing period

Temperature conditions for cultivation of crops are harsh in the Study Area , and growing crops in open fields is limited to the May-September period. Some measures

are required to extend the growing period such as cultivation of crops through raising seedlings and transplanting.

6) Cropping patterns and management of fallow land

In the case of non-irrigation cultivation, fallowing - wheat growing - fallowing is the cropping pattern (one crop every two years) commonly used for cultivated land in the Study Area. The cropping pattern of wheat growing - wheat growing - fallowing (two crops every three years) can also be seen in fields with soils having a high water content. Cultivation of potatoes or forage crops sometimes follow this pattern. Other cropping patterns can be seen as for example, in the case of alfalfa which has a 5-year cropping cycle, and wheat, 3-year cropping - Potatoes - Wheat - Potatoes, which is practiced on Harhorin Farm. Practically all vegetables are grown through irrigation cultivation. The crop rotation system is adopted to grow cabbages, turnips or carrots as "main" vegetables, with onions or cucumbers put into this system as "accompanying" vegetables. Potatoes are also grown in the crop rotation system for vegetables. The types of crops which can be grown are limited. It is necessary to increase the kinds of vegetables which can be effectively cultivated in order to establish the crop rotation system.

Farmland is fallowed in order to keep the soil moisture of non-irrigated fields, and to maintain soil productivity as well as for control weed. The result of certain experiments show that fallowed land has a 10 to 20% water content and has 30 to 60% fewer weed seeds than cropped fields. Farmland is plowed after harvesting before it freezes, and plowed once or twice during the summer season. Farmers are encouraged to cut wheat straws into pieces after harvesting and to place the pieces on their fields in order to prevent erosion and to supply organic matter. Agricultural machines designed for this work have been developed. One objective of fallowing is to ferment and decompose the wheat straws used for this purpose.

7) Fertilizer use and control of insect pests

Mongolia imports all of its chemical fertilizers. Fertilizers on the market include ammonia nitrate, double super phosphate and potassium chloride. Mixed fertilizers (17-17-17, 20-20-0) are supplied from Japan through a government sponsored aid program.

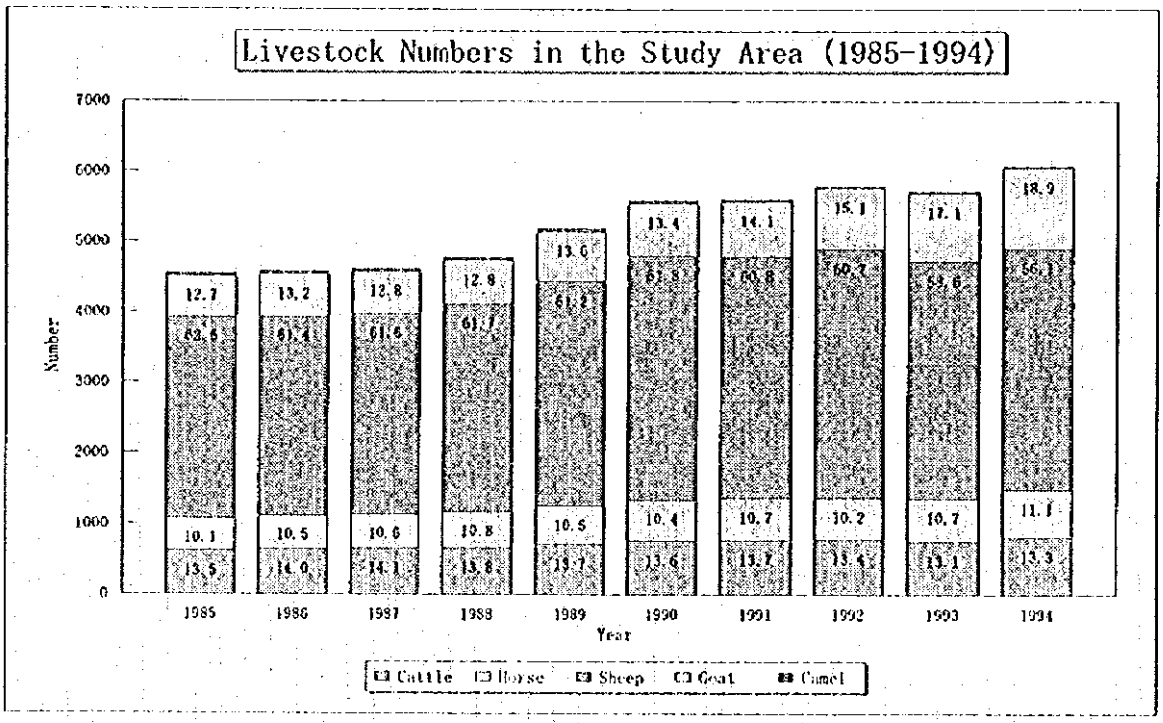
Fertilizers have not been imported recently except those which have been supplied through aid programs. Thus, chemical fertilizers are not applied to crops other than vegetables and fruits. In addition to a small amount of chemical fertilizer, sheep's dung is used for vegetables, fruits and sugar beets. In addition, nitrogen fixing bacteria fertilizers are being applied on an experimental basis, resulting in an approximately 20 to 30% increase in yield of wheat and potatoes.

Registered agricultural chemicals which can be used are determined through consultations among the Plant Protection Institute, the Ministry of Environment and the Ministry of Health. At present, 25 kinds of agricultural chemicals are registered. Agricultural chemicals are not allowed for use unless registered. Thirty different kinds of candidate agricultural chemicals were tested in 1995. Agricultural chemicals, application for which have been filed with the government, undergo two years of testing, and application registration for actual use is filed in the third year. Mongolia imports agricultural chemicals mainly from Japan, Russia, Germany, France and China. Some of the agricultural chemicals are used for cultivation in glass green houses in order to prevent mildew and mites. On the whole, however, agricultural chemicals are used in a very small quantity.
Because of frequent damage due to seedborne diseases, it is necessary to develop methods of disinfecting seeds which require only small amounts of agricultural chemicals.

3.4.3 Livestock Production
1) Trends in Herd Size traditional grazing animals of which there are five kinds: cattle, horse, sheep, goats and camels, commonly referred to as the five types of livestock. The other category of livestock primarily consists of such farm animals as pigs and poultry which have been introduced into the country relatively more recently. The number of livestock in the Study Area has been tending to rise in much the same manner as for the rest of the nation. The number of livestock animals rose to 5.79 million head in 1992, fell somewhat during the following year before increasing to 6.08 million head in 1994 (Table 3.4.3.1). The Study Area has registered an overall increase of 34% in the number of livestock being raised over the last ten years, which is almost double the rate of increase for the nation as a whole over the same period.
A comparison of the changes in the number of livestock animals by type for 1990 and 1994 shows that the number of sheep remained basically unchanged at 99% while the

number of camels being raised decreased by 59% for the same period. The number of cattle increased by 107%, horses by 116% and goats by 153% representing a fairly substantial increase.

Figure 3.4.3.1 Changes of Livestock Numbers Animals in the Study Area



A review of the numbers of livestock by aimag indicates that Ovorhangai Aimag registered a sharp increase, and had the greatest number of livestock in the country in 1993 at, and then had 2.35 million head of livestock in 1994. Ulaanbaatar city and the cities in Darkhan-uul and Orkhon Aimags showed a marked increase in the number of livestock animals, registering a 1.3- to 2.1-fold increase over 1990.

Three aimags and cities showed a more than 10-fold increase in the number of farms raising livestock over the same period. The concentration of livestock and nomads into cities is a source of concern in that it may have significant impact on the preservation of the ecosystem in the grassland and the conservation of the living environment around the cities.

The Study Area accounts for a major portion of pigs and poultry produced nationwide. The number of pigs and poultry was 23,000 and 74,000, respectively, in the country in 1994, representing a significant decrease from 1990 levels. The figures represent 17% and 23% of the pigs and poultry raised in 1990, respectively. The main reason for this large drop is that operators of large-scale farms which have been managed based on the state farm system have been forced to scale down their operation due to the confusion resulted from the nation's shift to a market economy.

A review of the number of farm animals by type of ownership shows that 76% of the livestock were owned either by the government or by negdel in 1960 when the type of ownership typical of the socialist system was established. However, the promotion of private ownership since 1990 has resulted in more than 90% of livestock animals being privately owned in 1994 (Table 3.4.3.2).

2) Status of Livestock Feeding

(1) Methods of raising livestock

The major patterns for feeding livestock in Mongolia can be classified into three types: (1) feeding of the five traditional types of livestock animals through traditional nomadism, (2) large-scale dairy farming through a combination of grazing and feeding in livestock barns, and (3) hog raising and poultry farming in facilities for that use.

The traditional nomadic way of feeding livestock requires livestock animals to move and graze in vast grasslands depending on the output of grass. Nomads generally change their camping sites four or five times a year depending on the season. They select grasslands located at a relatively high altitude as their camping site over the period from spring to summer, grasslands with grass highest in nutritive value over the period from summer to fall, and a place which is rich in grass and serves as a shelter from severe cold over the period from winter to spring. In general, the distance between camping sites is often 10 to 50 km.

On the other hand, large livestock barns and mechanized facilities have been constructed in the dairy farming, hog raising and poultry farming sector, and modern feeding and managing methods are used.

(2) Breeding of livestock

Breeding of livestock centers around seasonal breeding, and except for special milk breeds, which are bred with frozen sperm in many cases, natural mating is performed.

The main breeding index for initial mating is 24-26 months for cattle, 34-36 months for horses, and 18-20 months for sheep and goats. The number of productive years for breeding of adult female animals is 8-9 years for cattle, 11-12 years for horses, and 5-6 years for sheep and goats (see separate volume).

In Mongolia, bitterly cold weather continues from March to April when many livestock animals deliver. As a result, a large number of animals die during this period. The survival rate of delivered offspring was 87.2%, and the overall rate of raising offspring per 100 adult female animals was 68% in 1993. Both of these rates have been declining since 1989 (see separate volume).

It is necessary to lower the death rate and improve the raising rate during the winter, bring down the age of female animals at which they begin to serve as breeding animals through improvement of live weight gain, and improve feeding techniques for early marketing of castrated animals.

(3) Livestock breeds

Since the 1950s, Mongolia has introduced superior breeds of dairy cattle and double-purpose breeds for milk and beef from East European countries including the former Soviet Union so as to cross them with native breeds, and has worked on animal improvement through selection of native breeds of superior grade. Cattle breeds which have been introduced include Holstein, Steppe Red, Simmental, and Alatau (Brown Swiss). Of the dairy breeds, Holstein and Alatau have relatively high annual milk yield ranging from 2,800 to 3,000 kg, while Steppe Red and Simmental have annual milk yields of from 2,300 to 2,800 kg. Native breeds produce 400 to 600 kg of milk annually. A Selenge breed, which has been produced as a beef breed by crossing a Mongolian native breed with Hereford weighs much more than native breeds when it becomes fully grown (see separate volume).

The country is also trying to improve the quality of other livestock animals such as sheep through the introduction and selection of superior breeds. As a result, statistical data suggest that a gradual improvement in overall productivity has been observed, with the effects of improvement appearing to be particularly noticeable with goats (see separate volume).

A review of the proportion of the total number of livestock animals for each breed surveyed in 1993 (see separate volume) shows that Mongolian native breeds, including

Yak, accounted for 98% of all cattle, that all of the horses and camels are native breeds, and that almost all of the sheep and goats are native breeds as well.

3) Present state of intensive livestock industry

(1) Dairy farms

Since the 1980s, large-scale, mechanized dairy farms which keep 200 to 1,200 dairy cows and have a combined capacity of 19,000 head of cows to provide milk for urban residents have been constructed in 32 places in the Study Area thanks to aid from East European countries including the former Soviet Union. According to the data 1991 the farms had raised 15,900 cows and supplied 33,400 tons of milk to dairy product plants a year. At present, all of them, with the exception of one farm located in Ulaanbaatar, have been privatized (Table 3.4.3.3).

Dairy farms in the days of the former state farms were operated on the principle of putting first priority on production regardless of costs. Because they were privatized without taking any necessary measures to accommodate the changes in operation, some of the management units found it impossible to continue to operate due to a shortage of funds. A field survey conducted of those dairy farms revealed that many of the dairy farms surveyed suffered from a decline in the amount of milk produced because of a significant decrease in the number of milk cows, and could not even secure sufficient forage due to a shortage of funds. While there are some farms whose facilities have become idle, some farms are desperately making managerial efforts under severe economic and social conditions.

Under such circumstances, a dairy farm reorganization project was launched in 1994 through cooperation from DANIDA, and the project is scheduled to be completed in three years. This project is aimed at promoting individual dairy farming with a capacity of 10 to 20 head of cows after dividing and reorganizing five farms (one in Selenge, three in Tov, and one in Ulaanbaatar) chosen from among those dairy farms which are in serious financial difficulties.

One of the most serious problems dairy farms are faced with is the disposal of excreta. Large quantities of feces are produced and piled up out in the open, unused. There are many cases in which the department in charge of environment issues warnings to the farms responsible for such feces, saying that they would pollute the surrounding

environment. This problem arises from the fact that techniques for disposing of feces produced by large-scale farm operations have not been established, and necessary facilities for proper handling and disposing of such manure have not been constructed. Since excreta from livestock animals can be an important source of fertilizer if effectively used, it is necessary to establish a system which allows the crop cultivation sector to make effective use of such animal manure.

(2) Pig raising farms

There are two types of housing-type facilities used to raise pigs: medium-scale facilities which can house 30 sows for breeding, and large-scale facilities which can house 100 to 500 sows. These facilities are concentrated in the Study Area. Thirty-sow type facilities were built in 26 locations within the Study Area over the period from 1987 to 1989 in order to expand the pig raising sector. However, none of these facilities is currently operating now as business has failed for all of them.

Large-scale pig raising facilities were constructed as state farms in Ulaanbaatar and Darkhan in order to supply pork for urban residents. The facility in Ulaanbaatar, which was built in 1969 with aid from Bulgaria, can house up to 500 sows. However, the number of sows in this facility has dropped to 200. As a result, the farm could no longer continue to operate as a state farm, and was taken over by the adjoining meat processing plant this year.

Operators of pig raising farm in Ulaanbaatar cited reduction of or exemption from taxes at the time of purchase of breeding hogs, a system of low-interest financing, improvement of formula feed, as well as merger or stronger tie-ups with grain production farms as recommended measures to improve operation of and increase production on such farms.

(3) Poultry farms

A laying farm with a housing capacity of 100,000 hens was constructed in Ulaanbaatar to supply eggs for urban residents. This farm was originally built in 1963 with aid from China, and then expanded to its present scale in 1975 thanks to cooperation by the former Soviet Union. The farm has been operated as a state farm, but is now operated as a private company. The output of eggs significantly dropped as a result of a

decrease in the number of hens, which now total 50,000. Output records for 1993 show that an average of 185 eggs were produced per hen.

According to an operator of the poultry farm in Ulaanbaatar, several measures can be taken to improve operation. These measures include treating facilities and chickens more like private property, promoting the improvement of capability of hens, and improve the quality of feed. Furthermore, he said that he hoped that the government would establish a low interest financial system, and reduce taxes or exempt the operator from taxation when they import chicken broods from abroad.

4) Nomads

(1) Number of nomads

All nomads were members of NEGDEL under the socialist regime, but the number of individual management units is on the rise due to the dissolution of NEGDEL, and the division and privatization of state farms. While the nation had a total of 66,000 households operated by nomads, and 128,000 nomads engaged in nomadism in 1988, the respective figures increased sharply to 167,000 households and 377,000 nomads in 1994 (Table 3.4.3.4). Surveys conducted in the Study Area confirm this trend. There were 39,000 households operated by nomads, and 85,000 nomads engaged in nomadism in the Area. The reason for this is that the number of nomads increased only in figures due to the reorganization of NEGDEL and state farms, and because the number of nomads who have come to own livestock has increased due to the privatization.

(2) Number of livestock

During the days of socialist administration, although nomads raised and took care of livestock owned by NEGDEL, they were allowed to raise a limited number of livestock animals of their own (less than 50 head in the Hangai region, less than 75 heads in the Gobi region), and to use common facilities. The number of privately owned farm animals has been increasing since 1990 when people were allowed to privately own livestock, and the limit on the number of farm animals which could be privately owned was lifted.

In 1994, nomadic households which privately owned 51 to 100 head of livestock formed the largest group, accounting for 22% of the total, while those which privately owned less than 10 head accounted for 16%. The number of nomadic farms who privately owned more than 1,000 head increased to 144 farms, an increase of 97 farms

over the previous year (Table 3.4.3.5). A marked increase has also been noticed in the group of nomadic farms which own 100 to 500 head during the past few years. It is possible that the gap in the number of livestock owned by nomads will widen in the future.

(3) Work of nomads

The tasks generally performed by nomads can be roughly divided into three types: year-long grazing to support livestock farming, taking care of deliveries and nursing for reproduction, and milking and processing of dairy products to secure food. Nomads perform specific tasks during specific seasons all year round. In addition to relocating their camping sites four or five times a year to find a location suitable for each season, they take care of deliveries and nursing in spring from March to May, clip their sheep from March through June, milk adult female stock in June through November, make arrangements for mating in May through November, and make preparations for winter including stocking feed in July to September (see separate volume). Any of their tasks involving deliveries and nursing during the early spring, and milking and processing of milk products during the summer is hard work. Their grazing know-how of searching for good quality grass, and their techniques for deliveries and nursing have a significant effect on the performance of their business.

During the days of NEGDEL, nomads specialized in feeding and taking care of farm animals owned by NEGDEL and by themselves, which were classified by species, age, and other similar characteristics. Some nomads are faced with the problem of a labor shortage because private ownership of livestock has allowed a nomadic family to raise several kinds of livestock, resulting in an increase in the number of farm animals it raises, which, in turn results in an increased work load for the family. Such an increase in work load on the part of nomads is cited as one of the reasons why the school enrollment rate for their children has been declining recently.

5) Feed for livestock

(1) Nutrition for livestock

Feed used for the five types of livestock in Mongolia largely depends on the grassland grass. Livestock animals consume necessary amounts of nutrients from abundant grass available from summer to fall, but they are unable to take sufficient amounts of nutrients from winter to spring because this period not only brings the severe cold but

also comes during the carrying and delivery season of the livestock. As a result, livestock animals are said to lose as much as 30 to 40% of their weight during the winter through spring period (see separate volume).
Therefore, in order to reduce mortality of livestock and to improve productivity, proper feeding management is definitely required so that supplementary feed can be provided to minimize weight loss of the livestock during this time. Large-scale diary farms produce a small amount of milk per cow, ranging from 2,000 to 3,000 kg. This may be partly because such farms raise dual purpose breeds for milk and beef including Simmental, which have a low milk producing capability. Nevertheless, a shortage of supplied nutrients is considered a major contributing factor behind the low milk production levels at large-scale dairy farms.

In Mongolia, the Feed Unit (FU) is used to measure the quality and quantity of feed, while livestock-sheep conversion unit (Sheep Unit = SU; sheep: 1 SU, goats: 0.9 SU, cattle: 6 SU, horses: 7 SU, and camels: 5 SU) is used to examine feed supply and demand balance.

(2) Use of grasslands for grazing
Grasslands in Mongolia have different types of vegetation depending on altitudes, rainfall, soil conditions, etc., and farm animals are distributed so that they are able to graze on the vegetation most agreeable to them. It is for this reason that the composition ratio of the five types of livestock has not changed much for a very long time. Various attempts have been made to classify the types of vegetation. According to the report, in which grasslands across the nation are classified into five types, forest steppe account for 44.1% of total grassland area, while steppeaccount for 35.1% in the Study Area. In other words, these two types of grasslands account for about 80% of the total. From the standpoint of productivity of grasslands, the Study Area is fortunately abundant in grass resources.

It is not easy to evaluate grazing capacity in grasslands because output changes significantly depending on weather and other conditions such as precipitation and stocking intensity. Therefore, long-term surveys are required to obtain an accurate measure of grazing capacity. The above-mentioned report indicates that the optimum number of farm animals to be put to grazing (converted to Sheep Units) is 80 to 100 per 100 ha of forest-type grasslands, and 50 to 60 heads for steppe. The number of farm

animals put to grazing in the Study Area, which was calculated from the number of farm animals being raised in 1988, is 64 head, about 60% more than the national average, and is estimated to be ever more than this presently indicating that the Study Areas has a high feeding density for livestock (see separate volume).

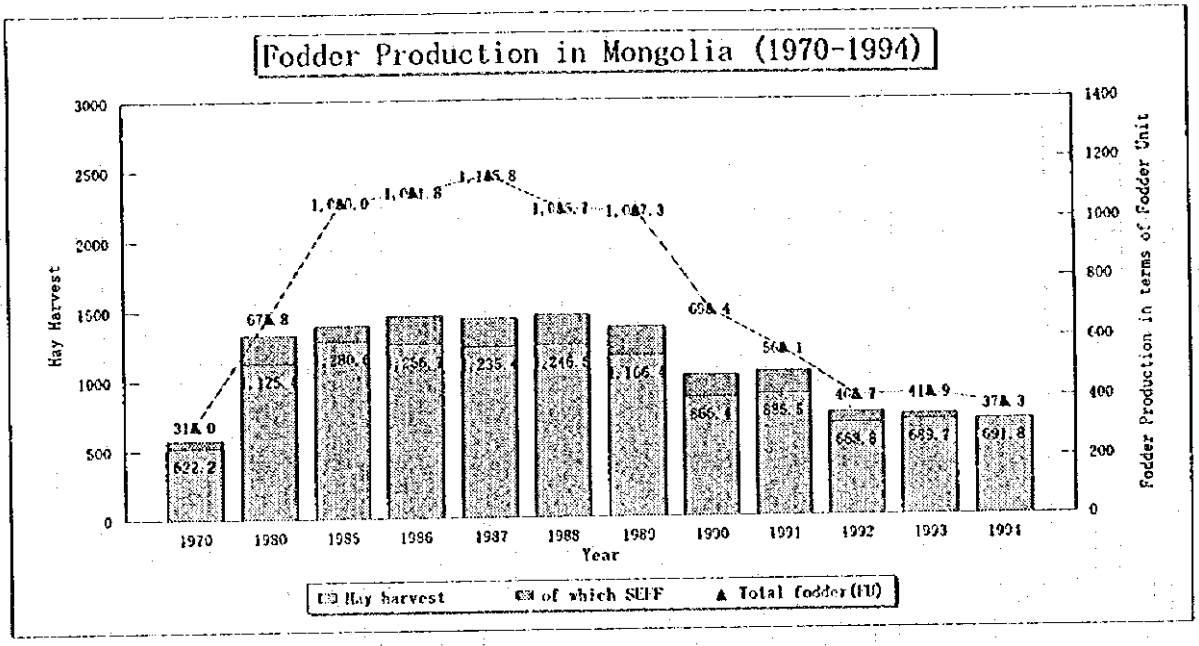
There have been reports that the degeneration and desertification of grasslands in Mongolia are advancing. Grass in poor growth condition was discovered in some places, mainly around wells or cities during field surveys, but this problem does not appear to have reached a serious stage in other parts of the area as a whole. Researchers, as well as aimag government and sum officials, who were asked to comment on this issue, had the same view.

However, in order to allow grasslands to reproduce grass, and use them continuously, it is necessary to evaluate the state of vegetation, and manage the use of grasslands carefully. This includes the suspension of grazing if deemed necessary based on the reproductive condition of the grass and other vegetation, as well as taking careful measures with regard to denuded areas, including suspension of grazing and a simple form of renovation.

(3) Production of hay

Hay is produced from grass grown in parts of grasslands with good stands as fodder for livestock during winter. Machines, such as balers, used to be used to produce hay at forage producing farms located in the Study Area. Output of hay across the nation has shown a marked increase since the 1980s, and reached a peak of 1,281,000 tons in 1985, but started to fall off in 1989, and has continued to decrease since then. Hay output has since dropped to about 50% of peak levels in 1993 and 1994 (Figure 3.4.3.2, Table 3.4.3.6).

Figure 3.4.3.2 Change of Feeder Production in Mongolia (1980 - 1994)



Hay production in the Study Area for 1994 shows that Selenge Aimag produced the largest amount of hay, followed by Tov and Bulgan Aimag. This area is also an important hay producer as it accounted for 41% of the total output of the nation during the year. Yield per ha, which varies depending on areas and places where grass is taken, is about 0.5 to 0.8 tons (see separate volume).

(4) Production of forage crops

Crops such as barley, oats and sunflowers are cultivated for use as silage and soilage on arable land. Tov Aimag, which accounts for 40 to 50% of the total output of the nation, has the largest output in the Study Area, while the Study Area itself accounts for some 70 to 80% of the nation's total output of forage crops.

However, the cropping area of cultivated land has been decreasing since the peak year of 1989, and the nation's total cropping area particularly for forage crops has decreased substantially from 108,000 ha in 1990 to 11,000 ha in 1994, which is about 10% of the 1990 level. Output of forage crops also decreased sharply to about 6% of the 1990 level. This resulted from the fact that a decrease in output in the Study Area (from 337,000 tons in 1990 to 30,000 tons in 1994) had a significant impact on the production level of the nation (see separate volume).

The main reason for this drop in forage production is that, although silage and soilage were produced mainly as feed for dairy cattle raised on large-scale dairy farms, the need for such feed declined due to the scale-down of dairy farming, or dairy farms themselves did not have energy enough to spare for the production of silage, etc. In addition, production of forage came to generate no profits because of an imbalance between cost and prices.

(5) Production of formula feed

Formula feed, which is given to dairy cattle, pigs and chickens raised on large-scale farms, is produced in feed plants attached to wheat flour mills located in various parts of the country. Output of formula feed also increased from the 1980s when large-scale farms were constructed, and peaked at 169,000 tons in 1989. However, it decreased substantially after 1990, and dropped to 14,000 tons, or just 8% of the 1989 output (Table 3.4.3.6). The scaling-down of the intensive livestock sector in dairy farming, hog raising and poultry farming, which are the main consumers of formula feed, due to the confusion resulted from the nation's transition to a market economy, is the main reason for this decrease in output.

The main ingredient for formula feed is wheat bran and ground offgrade wheat. Protein feed, fish meal, mineral, or vitamins have not been mixed in the feed recently. Therefore, piggeries and poultry farms have their own feed mixing facilities to add necessary additives. Although demand for formula feed is on the decrease because of a slump in the dairy, pig raising and poultry farming sector, demand for increased production of formula feed of good quality is expected to rise in the future as the country aims to expand this sector among its future livestock production targets.

(6) Use of wheat straw

Straw made from wheat or other crops is used as feed for livestock. Straw is packed with balers and distributed after the cereals are harvested. The quantities used increased after the 1980s, and in 1985, 188,000 tons of straw was used as feed. However, the quantities used have recently dropped sharply down to 22,000 tons in 1994 (Table 3.4.3.6). Straw is supplied together with silage and the like after being finely cut, or is provided after it has undergone ammonia processing and molasses has been added. This improves the nutritive value and digestibility of the straw, thereby

making straw a valuable source of roughage. The Study Area is a major crop producing area for cereals including wheat, and the development of low cost technology and utilization systems aimed at improving the utilization rate of straw is anticipated.

(7) State Emergency Feed Fund (SEFF)

In Mongolia, feed is occasionally in short supply due to regional draughts, large-scale snow damage or similar causes, and, as a result, a large number of livestock animals die. The State Feed Fund or SEFF was founded at the beginning of the 1970s for the purpose of stabilizing the supply of feed for livestock in the event of such emergencies. By the latter half of the 1980s, 22 centers and 89 storage facilities places were set up to cover the entire country (see separate volume).

SEFF would purchase feed from former state feed producing farms and formula feed plants, and then supply NEGDELs, former state dairy farms and other similar facilities with the feed. The government provided subsidies for SEFF to cover the cost for transporting the feed, and also provided SEFF with interest-free or low interest loans in order to finance feed purchases. SEFF at one time used these funds to purchase approximately 200,000 tons of hay and 80,000 tons of formula feed per year, and at the same time, it had a storage capacity of 77,000 tons for hay and 27,000 tons for formula feed in the event of emergencies. Recently, however, as the quantities of feed handled by SEFF have substantially decreased, its role is also undergoing a significant change.

While evaluation of SEFF has shown that it has performed its function of reducing the number of deaths among livestock animals due to snow damage which occurs every few years, a number of negative effects brought about by SEFF have been pointed out as well. These include the fact that SEFF required large amounts of funds resulting in sharp increases in feed prices, and that measures taken by the organization have led to increases in the number of farm animals in areas where grass resources are scarce, as well as distortions in feed prices and market distribution. In the future, market distribution systems will play a greater role in the handling of feed, while the reduction of the role of SEFF on the state level is presently under discussion.

6) Animal improvement

Tasks involving the animal improvement of animal health and quality such as development and implementation of an animal improvement plan are performed mainly

by the Department of Animal Husbandry of MOFA. Organizations on the national level other than the head office include the Artificial Insemination Center which sells frozen semen of breeding stock of superior grade and trains inseminators, and the Animal Improvement Company which exports and imports breeding stock of superior grade. On the local level, each Aimag has its own animal improvement section consisting of about three experts while one staff member in charge is assigned to each Sum office. The animal improvement section of each Aimag develops an aninal improvement program for that Aimag, and reports to the central government office, where the Department of Animal Husbandry has the task of developing an improvement program for the nation.

In order to increase stable production of livestock products in places where weather conditions are harsh as in Mongolia, it is necessary to utilize and improve native breeds that are suited to the weather and climate. As a matter of fact, the MOFA gives priority to a policy in which, among other things, the preservation of genetic resources and improvement of native breeds is actively encouraged through the selection superior livestock. However, since the budget needed to promote animal improvement is limited, MOFA and associated agencies do not have sufficient funds now, and thus are virtually unable to perform any tasks for animal improvement. There are also such problems as a loss of strong desire to make improvements because of low levels of achievement on the part of nomads, and a shortage of experts capable of performing improvement tasks.

In the area of technical cooperation with foreign countries in the animal improvement sector, a livestock genepool resource project was launched in 1944 in cooperation with FAO. Two experts, one in the animal improvement plan and the other in the area of artificial insemination, were assigned to the Artificial Insemination Center to perform their tasks in collaboration with RIAH over a two-year period.

7) Animal hygiene

Tasks concerned with animal hygiene are performed mainly by the Department of State Veterinary Services Division, in accordance with the "Animal Hygiene and Genetic Control Law of the State of Mongolia." Major specific tasks include (1) prevention and treatment of diseases in animals, (2) sanitary control of livestock products, and (3) prevention and control of epidemics.

Central government level, subordinate offices of the Division include the Animal Hygiene Central Testing Office, Instrument and Medicine Supply Department, Medical Supplies General Testing Office, Medical Supplies Manufacturing Plant as well as the Border Sanitation Inspection Office. In addition, a system has been established to work in close cooperation with the Veterinary Research Institute in the areas of technical guidance and the development of medicine.

Local organizations in the Study Area include the Division of Livestock Veterinarians located in each of the six Aimags of the Study Area and Ulaanbaatar city, as well as one branch office located in each of the Sum and villages. Aimag offices are staffed with about 20 officials including 10 veterinarians, chauffeurs and clerks, while a Sum office is staffed with a total of four officials consisting of three veterinarians and one chauffeur, and a village office is staffed with one veterinarian.

Although some animals suffer from illness caused by parasites, there have recently been no reported cases of any serious infectious diseases leading to big demages. Infectious disease vaccines are produced by the Medical Supplies Manufacturing Plant, but the country depends on imports for almost all its other medical supplies, and intends to produce such medical supplies domestically. Sanitation control of livestock, is handled by central and local inspection offices that perform inspections in accordance with standards set by the central government, and issue certificates when meat and milk are processed, sold, imported or exported. Instruments used for testing analysis have become old and obsolete, and this situation needs improvement.

Support from foreign countries in the area of animal hygiene exists in several forms. In addition to aid in medical supplies for animals furnished from Germany, technical assistance for improving and expanding services of the State Veterinary service Division, and technical assistance for the Veterinary Research Institute are provided from the EU and IAEA, respectively.

8) Output of livestock products

A study of the total output of meat in the country in 1994 shows that the output for that year decreased to 204,000 tons, representing 73% of the 1991 level. Mutton and chevr on accounted for 55% of all meat produced, followed by beef which accounted for 32%.

Output of milk was 313,000 tons and production of wool was 20,000 tons, both of which have been moving sideways for the past few years, while output of eggs decreased sharply (Table 3.4.3.7). Output of eggs recorded in 1994 dropped to one tenth the level of output posted in 1990. This is due to a decrease in the number of chickens raised at the poultry farm in Ulaanbaatar and a general decline in the productivity of the farm. There is data available which show output by Aimag. However, it can be understood that the Study Area accounts for a greater portion of processed beef products, and eggs produced in the country, since processing facilities of livestock products is limited to the outskirts of large cities.

Although output of milk decreased only a little, the quantities of milk collected by milk processing plants substantially decreased due to the effects of the worsening financial position of large-scale dairy farms. As a result, output of milk for drinking and butter supplied to urban residents is decreasing (see separate volume).

See separate volume shows the trends in the number of farm animals being raised and production of livestock products estimated for cattle and sheep, which are representative animals of Mongolia, from statistical data. According to this data, it is possible to increase the output of livestock products without depending only on an increase in the number of livestock being raised but also through improvement in the production and raising rates of livestock, increase in the weight of carcaes cattle or advancement of slaughtering time. For instance, since cattle weigh only 250 to 260 kg and sheep 35 to 40 kg at the time of slaughter, it is quite possible to increase their weight. Thus, some measures are likely to be developed in the future which allow farmers to fatten their animals in a short period of time prior to slaughter.

Table 3.4.3.7 Main Livestock Products in Mongolia (1960–1994)

Unit::1,000t, pieces

Item	1960	1970	1980	1985	1989	1990	1991	1992	1993	1994
Meat Total	184.5	179.8	226.8	225.9	239.6	248.9	281.2	251.2	216.1	203.9
beef	62.3	51.7	70.6	68.1	72.8	66.2	83.8	75.7	64.5	64.4
mutton/goat	96.2	95.8	115.7	116.2	121.9	132.3	135.9	116.3	112.5	111.9
pork	0.2	0.3	1.0	2.2	5.0	7.9	3.8	1.8	0.7	0.7
Milk	227.7	220.6	25.7	269.4	319.3	315.7	311.3	308.1	292.9	312.5
Wool	15.2	19.0	20.1	18.9	19.4	21.1	21.5	21.0	20.8	19.6
Butter	4.8	2.9	3.8	4.4	4.8	4.4	3.1	1.3	0.7	0.5
Eggs (min.)	1.8	5.7	21.1	25.9	35.8	38.0	25.5	18.6	10.0	3.6

Source: MOFA, and Statistical Year Book 「Mongolian Economy and Society in 1993」

9) Livestock Production Facilities

(1) Shelter for passing winter

Nomads set up simply constructed livestock barns at their winter camping sites to protect their livestock from harsh winter weather conditions. The foot of a mountain facing south is selected as the site for the shelters so as to avoid wind as much as possible. They are of simple construction: the south side is open, the walls are built of piled-up stones or wood, and logs or planks are used for the roof. Hay is often piled up beside the walls and on the roof not only serving as feed for the animals but also as heat insulation (see separate volume). Many of the shelters are constructed so that they have roof for heat insulation purposes, but about 20% of the shelters simply consist of enclosures without any roof.

The number of shelters increased after the 1980s, and a total of 21,500 barns, with a housing capacity of 5.07 million heads of livestock, were confirmed in the Study Area in 1994. This figure represents one barn for every 1.8 households, and a housing capacity rate of 83%. Compared with the national average, the number of shelters provided in the area is smaller. This is because the number of farms located mainly in urban vicinities, which newly own livestock, has increased sharply, resulting in a lower provision rate than in other areas, despite a continuous increase in the number of newly-constructed shelters.

The number of newly built shelters increased sharply after 1991. This indicates a change in the way animals are housed in this country - nomads started to construct their own shelters to house livestock which used to be housed in groups in the days of the NEGDEL (see separate volume).

(2) Facilities for dairy farming, pig raising and poultry farming

a) Facilities for dairy farming

Since facilities for dairy farming were constructed with aid mainly from the former Soviet Union, as well as from other eastern european countries, various facilities and machines are large in size just like those in the state farms of the former Soviet Union. Perhaps because most of the dairy farms covered by field surveys have not been taken good care of, many of the facilities are extremely worn out considering the number of years that have lapsed since their construction. A large amount of investment is required to maintain and manage the facilities because of their large size. Once the operators gets into financial trouble as they are now, they are unable to maintain their facilities. This becomes a vicious circle.

Mobile milking machines are used to milk cows during the summer because they are raised through grazing. When dairy cows are raised in barns equipped with heaters during winter, bucket milkers are used to milk them. Facilities for housing livestock consist of barns for cows, rearing stalls, bunker silos, coal-fueled boilers for heating, paddocks and other similar types of facilities (see separate volume).

Barns are mainly constructed of brick, while steel frames or concrete is used for beams. Prefabricated concrete sheets are placed on the ceilings of some barns. Slate and iron sheets are used for the roof. Dairy barns are mechanized, and equipped with vacuum pipes for bucket milkers as well as with barn cleaners for disposal of manure. Water cups are used to supply water, and hot-air ducts are installed for heating. For those farmers who raise livestock in barns in Mongolia, how to protect their animals from severe cold during winter is a great challenge.

The bunker silos are constructed in such a way that the ground is dug out, and then both sides are covered with concrete. Bunker silos are also large in order to meet the needs of the large number of dairy cattle. Many of the bunker silos are currently not in use at this time as companies have scaled down their operation. It is necessary to study these

silo structures which will allow silos to function with greater flexibility and meet the changing needs of operating scales or silage materials.

b) Facilities for raising pigs

Facilities for raising pigs include farrowing barns and rearing barns, but the main structure of the buildings is almost identical with that of the facilities used for dairy farming (see separate volume). Heating by means of hot water is provided in a hog raising farm in Ulaanbaatar. Self-feeders, which were installed at the time the building was completed, are now obsolete and do not function. A flush-type disposal system, which is operated manually, is used to dispose of manure. Facilities which appear to be in need of improvement include pig sheds for newly born pigs, which require a construction capable of providing sufficient heat insulation to increase the survival rate of young pigs, as well as barns for small pigs and rearing barns, in which the area of each pen needs to be reduced to house fewer numbers of pigs in order to relieve stress on pigs.

c) Facilities for poultry farming

Facilities for poultry farming include hen houses, rearing houses, poultry houses for hatching eggs, feed production facilities and heating facilities (see separate volume). Hen houses have three-layer cages, and are equipped with self-feeders and scrapers for disposal of manure. Rearing houses and houses for hatching eggs are of a floor feeding type, and barley or wheat straw is used for bedding litter. The main construction of the buildings is about the same as that of facilities for dairy farming and hog raising. Hot water is used for heating and hot-air ducts are installed in poultry houses. Ventilation consists of natural ventilation from the ceiling and forced ventilation by means of fans installed on the sides are used. Ventilation is important in poultry facilities, and it is necessary to take measures to cope with frequent power failures.

3.4.4 Processing and Marketing of Agricultural Products

1) Processing and marketing of farm products

(1) Flour mills and feed mills

Relatively large-scale wheat-flour mills are built in wheat producing areas or places where wheat flour is consumed to serve as facilities for storing and processing wheat. Silos are also built on the premises of flour mills to store wheat, and feed mills are also

attached to most of the flour mills to utilize such by-products as wheat bran and offgrade wheat. Major flour mills and feed mills as well as silos for storing wheat in Mongolia are summarized in Table 3.4.4.1.

Seven facilities out of eleven facilities listed in the table are located in the Study Area. Actual output records for 1993 shows that, compared with all eleven mills, these seven mills accounted for 82% of the total output of flour, 72% of the total output of feed, and 94% of the total storage capacity of silos. This indicates that facilities for storing and processing wheat are concentrated in the Study Area. There are many small-scale facilities for flour milling and feed processing in addition to those large-scale facilities.

During the period of socialist policies, wheat, the main ingredient used for producing wheat flour, was supplied as planned, and it was the role of a flour mill to deliver the wheat flour it produced to specified food processing plants. After privatization, every flour mill has been forced to carry out business operations from the procurement of wheat to sales of their products on a self-paying basis. This has resulted in an increase in expenses for purchasing wheat, and every flour mill is now faced with a shortage of funds. The large-scale flour mills currently in use were constructed over a period lasting from the 1960s to the 1980s with aid from the former Soviet Union. The productivity of these mills has lowered because of obsolete equipment and machines as well as a shortage of spare or replacement parts. As a result, output at these mills has been declining since 1990.

Table 3.4.4.1 Outline of Main Flour Mill, Fodder Plant and Grain Elevator in MONGOLIA

No.	Location	Flour Mill and Grain Elevator							Fodder Plant							
		Milling Capacity (Annual)	Production Volume (1000t)				Grain Elevator Capacity	Flour Storage Capacity	Production Capacity	Production Volume (1000t)				Grain Store House	Fodder Store House	Number of Employee
		(1000t)	1991	1992	1993	1994	(1000t)	(1000t)	(1000t)	1991	1992	1993	1994	1000t	1000t	(1994)
1	*Ulaanbaatar	40.5	45.9	47.2	40.2	29.8	64.0	1.0	-	-	-	-	-	-	-	244
2	*Suhbaatar	40.5	30.9	34.6	24.4	21.4	82.0	1.0	18.0	19.9	18.0	12.0	8.4	0.6	0.4	454
3	*Kharkhorin	16.0	16.2	15.0	8.0	7.5	12.0	0.8	12.0	13.2	9.5	3.6	5.9	0.6	0.4	214
4	*Bulgan	11.5	11.6	12.4	10.4	7.1	38.7	0.4	12.0	10.2	9.6	6.0	4.2	0.6	0.4	197
5	Ulaangom	9.0	10.1	9.9	6.0	7.8	4.0	0.4	3.0	4.1	3.3	2.0	3.1	0.6	0.4	153
6	Dornot	9.0	9.3	10.1	5.0	5.4	7.0	0.4	6.0	5.4	3.7	2.6	-	0.6	0.4	112
7	Murun	9.0	10.5	11.6	7.0	7.3	6.5	0.4	6.0	9.1	6.0	4.9	1.6	0.6	0.4	158
8	Undorhaan	9.0	9.9	11.8	6.6	5.8	4.0	0.4	6.0	5.0	5.4	3.0	0.1	0.6	0.4	167
9	*Darkhan	50.0	29.3	29.3	29.8	19.1	82.0	1.0	6.0	4.5	6.7	5.8	3.9	-	0.4	326
10	*Baruunharaa				0.2	0.2	-	-	13.0	8.9	5.6	5.2	4.0	0.8	0.6	100
11	*Hotol						34.0	-	-	-	-	-	-	-	-	70
Total		191.5	173.7	181.9	137.6	111.4	334.2	5.8	82.0	80.3	67.8	45.1	31.2	2.0	3.4	2,195

Source: MOFA

* Located in the Study Area

(2) Vegetable storage houses

Vegetable storage houses are built in consumption centers such as centers in each Sum and Aimag and the city of Ulaanbaatar to store large quantities of such root vegetables as potatoes, turnips and carrots, as well as cabbages and onions, which are preserved in summer when they are harvested, and supplied to citizens during the long winters.

Most of the facilities, except for the large-scale refrigerating facility equipped with an ammonia cooling system located in Ulaanbaatar city, are semi-underground storehouses built of brick, and many of them have a stove inside the storage houses to prevent vegetables from freezing during the winter.

The vegetable facilities located in Ulaanbaatar city are summarized in Table 3.4.4.2. There are six storage companies in total, and ninety storehouses in which a total of 32,470 tons of farm products can be stored.

A large amount of vegetables are lost during storage. Reduction of storage expenses including heating costs and transport costs associated with the procurement of vegetables is a prerequisite to operating storage houses. For this reason, some of the storage companies are working out ways to streamline their operations by cutting down expenses to purchase vegetables through efforts to grow vegetables on their own. However, facilities in general are in significant need of repair as they are often so obsolete that proper temperature control cannot be maintained, resulting in a loss of vegetables during storage. Despite this, many of the storage companies continue to use such facilities without repairing them due to a lack of funds. As shown in the table, the amount produce stored has dropped sharply over the past four years.

Companies which operate storage houses do not usually sell vegetables to the market. Many of them receive supplies of vegetables from production companies with whom they contract, and have a system in which they supply their vegetables on a stable basis to those who operate restaurants and food stores and thus have large demand for vegetables, for a fixed period of time.

Table 3.4.4.2 Outline of Vegetable Storage Companies in Ulaanbaatar

	Vegetables	Number of Storage House	Storage Capacity (ton)	Annual Storage Volume (ton)					Employees
				1991	1992	1993	1994	1995 (prospect)	
Total	Potato	33	23,200	19,344.9	14,413.7	5,867.6	4,080.5	5,800.0	
	Cabbage	23	5,050	3,681.6	1,554.8	2,190.4	850.8	1,320.0	
	Turnip	6	1,450	609.8	998.0	1,026.4	439.1	590.0	
	Carrot	9	870	511.2	561.9	588.8	310.0	300.0	
	Onion	19	1,900	1,467.7	1,635.0	47.6	23.5	93.0	
	Total	90	32,470	25,615.2	19,153.4	9,720.8	5,703.9	8,103.0	198

Source: MOFA, MONGOLIAN ECONOMY AND SOCIETY IN 1993

(3) Vegetable processing facilities

Since 1978, fruit and vegetable processing plants have been constructed in Sharingol, which is located in the northern part of Darkhan city, through technological and economic assistance provided by the Republic of Bulgaria. At present, these plants produce canned vegetables and fruits, bottled pickles, alcoholic beverages, and juices. The operators of these facilities have run into various problems. These include such things as: machines and equipment have become severely deteriorated after a lapse of 15 years from the construction of the first facility; there is a shortage of qualified personnel such as specialists and engineers to properly operate and maintain the facilities; supplies of fruits and vegetables used as raw ingredients have declined; and also there is a shortage of containers for packing the products. Despite these problems, they still operate their facilities even now.

(4) Processing of sugar and vegetable oils

Mongolia must depend on imports of sugar and vegetable oils as these foodstuffs are not produced at home. Although about 80,000 tons of sugar including refined sugar and about 2,500 tons of vegetable oils were imported annually before the country shifted to a market economy, imports of these foodstuffs have been declined since then. A basic policy which seeks to promote domestic production of sugar and vegetable oils and calls for support of the companies which process the foodstuffs in order to supply domestically processed sugar and vegetable oils to partially meet domestic demand for these products was approved in the Great National Congress as part of the food supply improvement program. A part of this program has already been implemented for sugar,

and a private company is now operating to cultivate and process sugar in Zuunhala, Selenge Aimag.

(5) Other food industries

Other farm product processing and marketing facilities include various types of food plants which can also be classified in the same manner as flour mills, as large-scale plants established as state plants, and local small-scale private plants. These facilities can be classified by food type into bread plants, confectionery plants, alcohol plants, and the like. Cities with a large population such as former Erdenet city and former Darkhan city have food complexes where these types of food plants are combined to form one plant. In addition to former state food plants, small- scale, private food plants have recently been built in local cities.

Table 3.4.4.3 Outline of Main Food Company in the Study Area

Foods	Unit	Production Capacity ①	Production Volume			②/①
			1993 (Actual)	1994 (Prospect)	1994② (Actual)	
Bread	ton	65,100	37,009.0	30,862.9	27,458.4	42%
Confectionery	ton	18,550	9,173.6	9,371.6	4,825.5	26%
Candy	ton	10,580	2,648.3	2,617.0	3,346.2	32%
Noodles	ton	5,820	1,429.9	1,224.2	1,229.7	21%
Arhi	1000L	4250	3,726.6	3,705.2	2,792.3	66%
Beer	1000L	10000	2,624.5	1,878.0	795.6	8%
Juice	1000L	9,400	5,842.1	7,097.4	4,249.0	45%
Alcohol	1000L	3350	2,240.0	2,103.0	1,849.3	55%

SOURCE: MOFA

2) Processing and marketing of livestock products

(1) Processing and marketing of meat

Meat is distributed to urban residents in the following manner. Meat processing plants located in Ulaanbaatar and Darkhan purchase livestock from local nomads early in the spring ever year. These farm animals are transported via the Tobal Route, sometimes over a remote distance of more than 1,000 km, and delivered to meat processing plants by fall. During transport, they are fed through grazing. They are slaughtered over a period from fall to winter, and supplied to urban residents or exported in the form of frozen meat. A portion of the meat is processed as ham, sausages and so forth.

In Mongolia, there are large-scale plants located in three places, Ulaanbaatar, Darkhan, and Choybalsan. In addition to these plants, a plant which mainly processes horse meat is located in Baghangay in Tov Aimag. The plant in Ulaanbaatar has an annual production capacity of 36,000 tons, the largest production capacity of the three plants located in the Study Area, followed by the plant in Darkhan with an annual capacity of 18,600 tons, and the plant in Baghangay with an annual capacity of 3,300 tons. Recent production records indicate that output at the plants in Ulaanbaatar and Darkhan shows a downward tendency. Still, they play an important role in the supply of meat for urban residents and exports.

Table 3.4.4.4 Meat Processing Plant in MONGOLIA

(Unit: ton, people)

Place	Capacity per year	Operation Results					Capacity of Refrigerator	Number of Staffs	Remarks
		1991	1992	1993	1994	1995			
Ulaanbaatar	36,000	55,643	32,864	10,428	7,820	13,298	16,000	1,300	In S.A.
Darkhan	18,600	17,807	8,387	970	4,666	3,785	3,200	520	In S.A.
Domod	14,400	16,640	11,129	4633	2,016	1,464	3,000	488	
Baghangai	3,320	-			- 840	2,860	600	120	In S.A.
Domogobi	1,500			697	587	687	450	130	
Zavhan	1,500			528	448	36	450	124	
Bayan-ulgii	1,500			1,030	1,030	1,030	450	196	In S.A.
Total	76,820			18,286	17,437	23,160	24,150	2,878	

Note: Baghangai plants is planning to start its operation from this year
Source: MOFA

The Ulaanbaatar meat processing plant, which is largest in scale, was constructed through aid from the former Soviet Union to supply meat to the residents of Ulaanbaatar, and started operations in 1968. The plant, which currently employs 1,300 people, consists of the four main facilities, a slaughtering and dressing facility, a freezing and refrigerating facility, a facility for processing and packing cut meat, and a facility for producing sausages and canned meats, as well as a facility for manufacturing casings built jointly with Germany. The plant also includes a meat research institute. This plant produces cut meats as well as dressed carcasses, sausages, edible oils and fats, canned products, casings, bones, and blood meal. Although the plant has such problems as superannuated facilities and a lag in processing technology, functional improvements are in progress in cooperation with Germany.

The Darkhan meat processing plant was built in 1974 through aid from Hungary. It has a staff of 520, and produces processed foods such as sausages, edible oils and fats, casings, bone, blood meal, in addition to dressed carcasses. The plant does not process cut meats. This plant has become so superannuated that the freezing and refrigeration facilities, in particular, have shown severely deteriorating conditions, such as leaks of ammonia gas used as a refrigerant, causing problems to the storage of meat and the preservation of quality. However, rehabilitation project of refrigerating system Japan and the plant was equipped with new refrigerating. It is expected that the operation to the plant would be increased more in the nearfuture.

The Baghangay meat processing plant has been completed most recently through aid from Finland, and started operation in 1994.
In addition to these plants, meat storage houses equipped with refrigerating facilities are provided in Ulaanbaatar city and the central part of the Aimag. However, they have also become severely superannuated, just like the meat processing plants, and their refrigerating capacity has declined.

(2) Milk processing facilities
Large-scale milk processing plants are provided in four places, Ulaanbaatar, Darkhan, Erdenet, and Choybalsan, to supply milk and dairy products to urban residents. In addition to these plants, food processing plants located in the provincial capital of each Aimag process dairy products on a small scale. Of those plants, the plant in Ulaanbaatar is the largest in the entire country, and has an annual processing capacity of 60,000 tons, while the Darkhan plant has an annual processing capacity of 5,000 tons, and the plants in Choybalsan and Erdenet have an annual capacity of 3,000 tons each

Milk for urban residents used to be transported to processing facilities from dairy farms by milk delivery trucks through milk collecting centers equipped with cooling facilities under contract to milk processing plants. Since most of the milk collecting centers have ceased to function, milk is now transported directly from dairy farms by milk delivery trucks to processing facilities.

The Ulaanbaatar plant was built in 1985 with aid from the former Soviet Union to supply milk and dairy products for the residents of Ulaanbaatar, and produces such

dairy products as yogurt, ice cream and powdered milk, in addition to pasteurized milk. However, this plant has become so super, annoted that the refrigeration facilities have shown deteriorating conditions. Under these situation, rehabilitation of Ulaanbaatar dairy plant project has implemented by Japanese aid. This project, completed in 1995, has included the rehabilitation of the refrigerating system and other related equipments and introduction of the milk collecting fruits.

The plant used to receive a supply of ingredients from dairy farms located in Tov, Selenge and Henti Aimags and Ulaanbaatar through milk collection centers. Because dairy farms have scaled down their operations and the milk collection centers have since ceased to function, the present amount of collected milk is much smaller that it used to be.

Table 3.4.4.5 Meat Processing Plant in MONGOLIA

(Unit: ton, people)

Place	Capacity per year	Operation Results						Capacity of Refrigerator	Number of Staffs	Remarks
		1990	1991	1992	1993	1994	1995			
Ulaanbaatar	60,000	38,082	30,729	16,717	9,742	2,415	2,275	1,800	375	In S.A.
*Ulaanbaatar	1,800				1,081	417	317	150	40	In S.A.
Ovorhangai	1,500				354	63	200	100	157	In S.A.
Darkhan	5,000		2,113	1,744	765	796	240	200	280	In S.A.
Erdenet	5,000	-	-	-	-	-	-	-	-	(Suspended)
Dornod	3,000				390	166	757	180	255	
Uguuul	3,600				216	150	216	500	50	In S.A.
Others: Alhangai, Bayan-ulgii, Dornogobi, Zavhan, Dundgobi, Hengili, Uvs, Hovd, Cobialtal		Capacity per year: 1,500 ton						100	40~155	

Note: *Milk processing plant for children
Source: MOFA

The Darkhan plant is operated as one division of a food complex. This plant was constructed through aid from the former Soviet Union, and started operation in 1971. It produces dairy products including yogurt, cream, ice cream and Aalts in addition to pasteurized milk, and supplies its products to Darkhan-uul and Selenge Aimags as well as to Ulaanbaatar city. It used to collect milk from dairy farms located in Darkhan-uul and Selenge Aimags. However, the number of the dairy farms has decreased, resulting in a decrease in the amount of collected milk. Under such circumstances, the plant can supply pasteurized milk only to hospitals and day-care centers.

The Erdenet plant is now out of operation due to decreased amounts of collected milk.

The amount of milk supplied to those plants are on the decline. It is necessary to rehabilitate operation of dairy farms, and establish an efficient system for collecting milk from nomads.

(3) Other livestock products

Plants which process wool, cashmere and animal hides are concentrated in Ulaanbaatar, Darkhan and Erdenet. With the collapse of the state procurement system used by the former government to secure raw materials, each of the plants now purchases raw materials from nomads directly or through a provincial organization, processes them into products, and delivers the products to domestic markets for consumption or otherwise exports them. For this reason, each plant must secure raw materials on its own. However, it is becoming more difficult for many of the plants to secure raw materials due to a shortage of funds, resulting in a decrease in output.

This area requires business operators to give greater consideration to the potential of international markets. Recent trends show that exports of raw wool and raw leather are on the rise while exports of finished goods are on the decrease.

Ulaanbaatar, Choybalsan and Ulgy each have a large-scale wool scouring plant. The Ulaanbaatar plant is the largest of these three, and has an annual production capacity of 6,000 tons. However, raw materials are hard to come by recently, and output of the plant dropped to 25 to 30% of its full capacity level. About 70 to 80% of scoured wool is supplied to textile factories in the country, while the remainder is exported mainly to Europe.

The cashmere processing plant located in Ulaanbaatar is an integrated manufacturing plant completed in 1981 under a grant-in-aid program provided by Japan. Since the export of raw cashmere wool was banned in April 1995, most of the raw wool produced in Mongolia is processed at this plant. In addition to processing raw cashmere wool into cashmere products, the plant supplies cashmere as a textile material to factories in the country, and exports it, with 65% of the exports going to Europe.

Large-scale hide plants located exclusively in Ulaanbaatar, where raw hide processing plants, secondary product manufacturing plants, research institutes, etc. are concentrated. They used to be operated as one plant but were divided into fourteen companies in the process of privatization. There are five rawhide processing plants, each of which is capable of processing 1.2 million goats and sheep hides annually. However, their

current actual output is about 40% of their maximum level. Products are supplied to secondary product manufacturing plants located in the country, and exported. However, exports have been on the decline recently because of the widening gap in prices between Mongolia and world markets.

3) Other matters related to distribution and processing

(1) Food markets

Food zaha, which is controlled by the Agricultural Commodity Exchange, is located in the center of each Aimag and serves as a farm product market. Zaha is a system in which anyone can freely engage in trade once he is registered with the Agricultural Commodity Exchange and has paid fees in proportion to his sales or rent for the area of the sales counter used. For this reason, producers often directly sell their products in a market located near a city.

Producers living in a place far away from a consumption center must either conclude a contract with vegetable storage companies or sell their products to vegetable brokers. Vegetable brokers are not organized as a company but are a firm under private management, and the number of vegetable brokers is few.

In Ulaanbaatar city, which has a population of 600,000 and is a place where a large quantity of vegetables are consumed, almost no wholesale or brokerage organizations have been formed, and producers sell their products directly just like producers in local cities. It is necessary to create a wholesale market for the smooth distribution of agricultural and livestock products and the formation of fair prices.

(2) Food sanitation

Bacterial contamination of food, the presence of toxic substance in food, and other food sanitation problems have been pointed out at each of the distribution, processing and sales stages. There is no organization in charge of monitoring the sanitary conditions of food. In order to promote health care for the populace and develop the food industry, it is necessary to establish sanitary standards, and take appropriate administrative measures, such as employing food inspectors and developing an organization for monitoring food safety.

(3) Packages used for marketing food

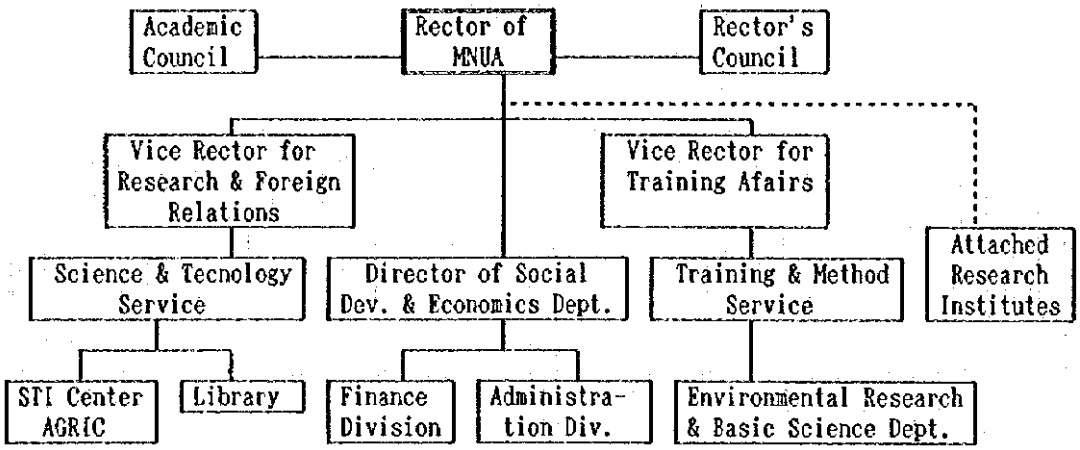
While for the most part not directly related to production, there is a shortage of packaging materials, which are important to the smooth distribution of food products. For instance, glass bottles, which are indispensable for beverages such as beer and juice, were originally produced in Mongolia. However, glass plants were forced to suspend production due to the deterioration of the economic environment, resulting in a shortage of glass bottles at beer and juice producing plants in various parts of the country. This, in turn, forced the beer and juice producing plants to cut back on production because they could not bottle their products even if they had ingredients to make them. Some plants have filled immediate needs by importing expensive glass bottles from Russia and other countries. Favorable effects on the distribution of food can be expected from the development of a packaging industry which produces standardized food packages including glass bottles and wooden boxes, as an ample supply of packages is helpful in moving food products, and may result in an increase in consumption. Therefore, it seems important to develop plants which are capable of manufacturing packages of various materials through the introduction of new technologies in the future.

3.4.5 System for Supporting Agriculture

1) State-run research, extension and human resources training system

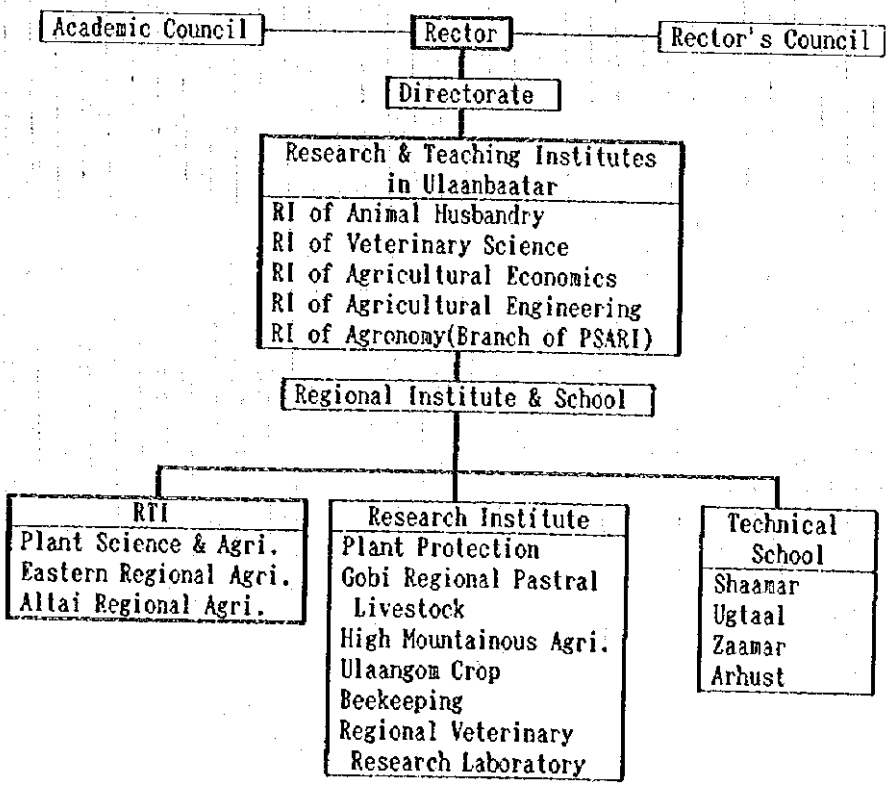
The National Agriculture University, which was established in 1993 as an organization controlled jointly by the Ministry of Education and Science and the Ministry of Food and Agriculture is positioned at the top of the pyramid under the current training, extension and human resources development system of the country. The goal of the university is to enhance cooperation between the government, industry, and the academic world, develop special and practical techniques and know-how, as well as to cultivate human resources efficiently and assign personnel across the country effectively.

Figure 3.4.5.1 Organization of Mongolian National University of Agriculture



The university oversees seven research institutes (organized by fields and regions). The university is responsible for providing basic education while the research institutes are responsible for technological development, increase the numbers and distribution of quality seeds, development of guidelines on production control of crops and livestock, and training of specialist technicians. The research institutes are also required to review agriculture and livestock policies, and offer suggestions regarding the formulation of policies concerning the respective field of each institute.

Figure 3.4.5.2 Organization of Attached Research Institutes



However, although a system is currently in place, improvements still need to be made in such areas as personnel, facilities, and budgets. The research institutes are particularly faced with the serious problem of a lack of technology, knowledge and skills which meet the requirements of a market economy. Under such circumstances, some research institutes have begun projects in collaboration with Australia, Israel and other countries, and requests for assistance from foreign countries are being made to promote such cooperation even further.

2) System for providing agricultural guidance and promoting extension at the field level

Expert organizations, such as the Agricultural Improvement Extension Centers in Japan, have not been established in local areas below the Aimag level. These organizations have a system in which about three senior level experts, each specializing in a different area, are assigned to the Agriculture and Livestock Department of each Aimag, receive technical guidelines from the central government, and provide guidance to farmers directly or through the Sum office in the jurisdiction. As part of this educational program, almost all the Aimags provide training for herders and company managers for a period ranging from two weeks to three months during winter. However, these training programs are confronted with the following problems: necessary expenses must be paid by participants as Aimags are unable provide sufficient financial assistance; Aimags cannot purchase textbooks, or find experts who can serve as instructors; and it is difficult to dispatch instructors to provide guidance, or call herder together to take training because they are scattered in a wide area.

The nomadic livestock industry plays an important role not only in supplying food for the people but also in supplying raw materials for the woolen textile industry and hide/leather processing industry, which are the major source of foreign exchange in the Mongolian economy. Therefore, it is very important to provide assistance to improve management know-how in order to adapt to a market economy towards which the country is moving, as well as to improve livestock breeds and promote the improvement and/or acquisition of feeding and production techniques.

3) Farmers' organizations

Former state farms and negdels (agricultural and livestock industry cooperative associations) were divided and privatized or dissolved in the wake of the country's transition to a market economy system. State farms assumed the character of state-

operated management units mainly involved in crop production, and thus were not cooperative organizations for farmers. negdels, on the other hand, were collective farms, mainly consisting of herders, and assumed the character of cooperative organizations more strongly than state farms. However, in reality, they were a production arm integrated into the national organization under the planned economy system.

Herders were organized through the establishment of socialistic collective organizations called negdels over a period from 1956 to 1959. These organizations were setup in each Sum to raise livestock owned by the state. An Aimag NEGDEL was organized as the superior body in each Aimag, and a NEGDEL Federation was founded within the central government to coordinate and oversee the activities of the negdels. The negdels were controlled by this NEGDEL Federation, through which government's polices and information on operation and management were conveyed to local negdels.

Negdels were disbanded in the wake of the privatization of agricultural and livestock production, and most of the farm animals became privately owned. A review of the organizational changes effected in Argalant Sum in Tov Aimag after the dissolution of the negdels shows that the Sum NEGDEL was subsequently divided into the following four organizations: an organization called horshoo (cooperative-like owned companies) which mainly engages in nomadism to produce wheat, horshoo which produces vegetables and potatoes, and two service companies which purchase and transport agricultural and livestock products as well as sell daily necessities.

It is assumed that all the other Sums more or less underwent the same type of changes in organizational form. However, negdels, which were mainly comprised of herders used about 20% of the total arable and to produce crops, and some of them owned agricultural machines, grain storage houses, and processing plants. It is assumed from this that qualitative changes in organizational forms among different negdels varied greatly depending on the types of assets privatized or on the way those assets were utilized. The above-mentioned two service companies, for example, have a character similar to the service divisions which became independent of negdels, and have become more specialized in agricultural and livestock production. However, they have weakened as an herder organization.

Aimag negdels need to be reorganized in their roles and functions after the dissolution of negdels, but their organizational and functional definition in the new setup is not clear. Because they are forced to operate on a self-paying basis, their functions related to provision of guidance and support for the herders they used to be responsible for have significantly deteriorated. As a result of the dissolution of negdels and reformation of Aimag negdels, the NEGDEL Federation in the central government underwent functional changes. The NEGDEL Federation was renamed the National Union of the Mongolian Agricultural Cooperatives in 1992. Its structure and role were also changed considerably, and are now different from the old organization. The new organization is aimed at protecting the interests of its members, promoting union activities in accordance with the movement towards democracy, acting as a go-between for production and efficient management on the part of its members, and promoting international exchanges. However, it was founded so recently that it is not yet fully performing its tasks to achieve those objectives.

4) Present state of financing and mutual aid system

(1) Agricultural financing system

With regard to financial institutions for agriculture and livestock industries in Mongolia, the Mongolian Cooperative Bank for Agricultural and Livestock Industry was organized in February 1991 to provide financial support to unions related to agriculture and livestock industries. This bank was renamed the "Mongolian Agricultural Bank" and its services were expanded to cover organizations related to agriculture and livestock industries and individuals. This is a small bank capitalized at Tg 0.47 billion and has 22 branches and 297 service outlets in local areas.

Interest rates on deposits include a monthly rate of 1 to 2% for ordinary deposits, monthly rate of 5% for one-month time deposits, and an annual rate of 80% for one-year time deposits. The lending period ranges from one to six months with a monthly interest rate ranging from as high as 5 to 12%. However, those interest rates are lower than those offered by other financial institutions. Loans are available to companies raising more than 200 farm animals or capitalized at Tg 2 million or more. The Loan Committee determines the amount of each loan and interest rate after examining the collateral and operating conditions of the applicant.

Funds raised through the sale of commodities provided by international agencies and donor nations were used to set up the "Food and Agriculture Fund" in August 1994. This Fund provided loans for 18 wheat producing companies in 1995. Loans are aimed at increasing the productivity of agricultural and livestock products, improving production structures, stockpiling food and seeds, and preventing natural disasters and damage caused by disease and insects as well as providing relief for those who have suffered from natural disasters or such damage, to support projects for promoting the "National Program on the Population's Food Supply Improvement."

(2) Present state of the mutual-aid and insurance system

In Mongolia, no suitable legislation or body of law has been with an associated legal system has not been formulated yet for mutual-aid and insurance services, and there is no public organization which provides such services. At present, the Mongolia Agricultural Insurance Company offers private agricultural insurance which covers livestock, crops and farming facilities.

The insurance premium is 2.5% to 3.% of the appraised value for livestock, 6 to 15% of the appraised value of the reference yield for crops, and 1.5% of the appraised value for fixed capital and transportation equipment and facilities. The amount of insurance to be paid in the event of a disaster is assessed depending on the condition of the disaster, with an upper limit set at 80% of the damage. 3 to 5% of the total number of farm animals, and 10% of the total area of cultivated land are currently covered by this insurance.

(3) Problems with the financing system

The Mongolian Agricultural Bank has the largest operating network in Mongolia. However, its operation is inefficient because of the small amount capital available and small balance of savings due to difficulties the bank has in finding depositors in local areas. In addition, the bank is not making any progress in collecting debts carried over from the former regime, which have comprised part of the funds used to set up the bank, nor the bad debts incurred during the period of confusion during the transition to a market economy. This has resulted in the poor turnover of capital and a shortage of loan funds.

Companies engaged in agriculture suffer from a shortage of operating funds, and some small companies still cannot carry out independent operations. They end up going bankrupt instead of making effective use of the funds furnished from a bank because few operators of such companies are equipped with a keen sense of management. As a result, the circumstances regarding the recovery of used funds is getting worse. Furthermore, even if the Mongolian Agricultural Bank offers loans at lower interest rates than other banks, its lending conditions are viewed as severe in terms of the length of time it takes farmers to recover their funds and productivity because of the high increasing rates for commodity prices in Mongolia and the high official discount rate of the Mongolian Central Bank. These factors result in a high lending risk despite the large demand for funds, and thus the bank is far from fully being able to perform its functions effectively.

In addition, the Food and Agriculture Fund has just started to provide funds to 18 companies which financial institutions for agriculture refused to finance because of their past loan records and relatively poor financial conditions. Therefore, a specific method of selecting and examining potential borrowers has not been developed. Since the Fund has a small amount of funds available to lend, it may not meet all the financial requirements of demand, and as a result, the number of borrowers may be limited.

(4) Problems with the mutual-aid and insurance system

Insurance services are provided by the Mongolia Agricultural Insurance Company mentioned above, which is a voluntary private company throughout Mongolia. However, the number of companies which buy insurance on their own initiative is small because of insufficient knowledge about insurance. Furthermore, laws related to insurance have not been developed because of a poor understanding of the insurance system on the part of the public and the members of the Great National Congress. Thus, the government does not grant any aid to those companies which buy insurance nor to the insurance provider.

Both the insurance provider and those who have purchased insurance policies have a feeling of unfairness because there is no organization which investigates into the cause of any accident or a disaster, or which is capable of making objective assessments of the extent of any damage. The small capital of the insurance company and the small number of companies who buy insurance have resulted in high premiums and a small

amount of internal revenue funds. In addition, because the insurance provider is not reinsured, it may not be able to pay insurance in the event of a large accident or disaster.

3.5 Rural Society

1) Population and employment

The government has implemented a population increase policy through tax cuts and a commendation system in Mongolia since the 1960s. Partly because of the effects of this policy, the average population growth rate during the period from 1960 to 1990 was as high as 2.6%. However, the population growth rate decreased by nearly one point percentage to 1.0 - 1.5% after the nation shifted to a market economy due to a sudden deterioration in the economy and living conditions.

The implementation of the past policy with overriding priority given to industrialization resulted in concentration of the population in urban areas. As a result, the ratio of urban population to the population of the entire nation reached 57% in 1989, but it has shown a downward trend since then. This is because cities cannot accommodate all of the people who lost their jobs due to massive layoffs resulting from the privatization of state enterprises after the nation's shift to a market economy. As a result, many people returned to rural areas.

This has largely contributed to an increase in unemployment, as well. The number of unemployed people registered was 30,000 (an unemployment rate of 3.8%) in 1989, but the number increased to 75,000 (an unemployment rate of about 9%) at the end of 1994. The trend is more noticeable in rural areas (Aimags and Sum), and it was pointed out that the registered unemployment rate reached as high as 15 to 20% (this rate is even higher when unregistered jobless people are included; Note 1).

In addition to an increase in unemployment, a decrease in wages in real terms due to inflation and a decrease in income because of a drop in prices of agricultural and livestock products largely contributed to a sharp increase in the number of people in the group of poor households (Criteria in September 1994: Urban districts - total income of less than Tg 4,200 per person per month, rural districts - total income of less than TG 3,700 per person per month). In 1994, close to 30% of the total population was said to belong to the group of poor households.

These are significant factors which inhibit economic and social growth and stabilization. The government, therefore, took up unemployment and poverty as the two major problems it should tackle in its policy for rural society, and formulated a "Poverty Relief Program" in 1994. Concrete measures include improvement of markets and infrastructure, improvement of services such as health, expansion of the financing system, and creation of employment opportunities through the promotion of small rural industries in local areas.

2) WID

The environment surrounding Mongolian women has changed greatly due to the country's shift to a more open society. During the period of socialist rule, women benefited from various services (day-care centers, nursery schools, other service centers and public health facilities for expectant and nursing mothers in rural districts) designed to ensure equality of the sexes and equality in employment opportunities and participation in society. A system was in place which allowed women to play an active part in many fields. However, most of those facilities were closed due to the social and economic confusion after the change in political leadership towards a democratic government. As a result, most domestic duties have fallen on the shoulders of women, and the number of women who participate in the process of social decision making is on the decrease.

Expectant and nursing mothers in the nomadic population in particular have been confronted with certain health problems because facilities for pregnant women (where pregnant women living in rural districts receive pre-delivery care one to two weeks prior to delivery) were closed, or the number of beds in such facilities were reduced as a result of the dissolution of the negdels after privatization. This has resulted in the death rate of pregnant women in rural areas becoming considerably higher than in urban districts. In addition, since the privatization of livestock, an increasing number of women have become engaged in, among others, milking and traditional production of dairy products, in addition to domestic chores, due to the diversification of the livestock species and an increase in the number of farm animals being raised. In Mongolia, the following WID-related measures are being taken through aid from international agencies.

(1) Improvement of poverty conditions for women is one of the main themes of the "Poverty Relief Program" announced by the Mongolian government in 1994. Specific measures include training through the establishment of special training centers for women, provision of information, loans to women, and NGO support related to WID.

(2) The UNIFEM is supporting projects designed to improve the status of women. The Mongolian Women's Federation has funding of $30,000, and furnishes funds for women's groups. The UNIFEM provides cooperation in this project.

(3) The ILO is implementing a project aimed at increasing home incomes in collaboration with the Mongolian Women's Federation, using funds provided by the UNFPA.

(4) The Mongolian Women's Federation has set up training and production centers exclusively for women, and supports 250 women a year who try to acquire skills in sewing, knitting or typing.

(5) In addition, the Asian Development Bank, giving special/particular attention to WID among other matters in the social sector during the 4th Conference of Supporting Nations, announced that it was conducting a survey of the current social conditions of women and is making preparations for measures to secure loan funds for women.

Thus, Mongolia has a system for carrying out various activities for educating women including the protection of women's rights, and participation in social movements through the Mongolian Women's Federation, which plays a central role, branches in Aimag and personnel assigned to Sum and Bag. However, this system is not fully functioning from the standpoint of ensuring women's positive participation in each stage of development.

3) Public health and medical care

Under the socialist regime, a system was in place which provided free medical-care and public health services for everyone through systematic procedures starting from the central government to Aimags, from Aimag to Sum, and from Sum to Bag. After the nation's shift to a new government, the regional public health and medical care services were put under the responsibility of Aimags and Sums. However, they could not

maintain the service system due to the aggravated economic situation and tight financial conditions, and, as a result, the long-established procedure is giving way.

There has been a gap in service between urban and rural areas (for example, the number of doctors per 10,000 population is 51 in urban areas and 17 in rural areas), and this gap is increasingly widening due to the inadequate traffic and communication system in rural areas and much higher service costs required in these areas as compared with cities. This is combined with a shortage of food which together aggravate the health condition of the population, particularly in rural areas.

To improve the situation, the government established a health insurance system in 1994, and ordered Aimag and Sum governments to provide regional health care centers. Health insurance is provided by the government and the private sector, and covers some 2.10 million people (92.4% of the population), 76.2% of which are covered by health insurance provided by the government. In addition, measures are being taken to reduce the death rate of mothers and children, protect the weak and infirmed, and expand sanitary control centers, though they have not produced sufficient results yet. Japan provides assistance for facilities in 40 hospitals located in Sums in various parts of the country.

4) Education and culture

Mongolia used to give high priority to education as can be seen in the appropriation of a large portion of its national budget to education (in 1990, 25% of the budget, or 14% of GDP). However, it became impossible to maintain past levels of expenditures when the nation suffers from budgetary deficits after the transition to a market economy, and such measures as cuts in personnel, partially charging for meals served in dormitories, a reduction in subsidies for clothing, charging for school fees of universities and special schools. As a result, the share of education expenses in the national budget has dropped to 15% of total expenditures in 1993, or 3.8% of GDP.

There has been a sharp increase recently in the number of pupils and students who do not go to school (the proportion of school-aged children and students who do not go to school: 4% in 1988, 30% in 1994). This problem is serious particularly in areas with high levels of poverty or nomadic regions. The main reasons for this are the charging of various fees as mentioned above, deterioration in ability to subsidize costs due to an

increase in the number of people living at poverty levels, as well as an increase in the work load of livestock farming due to the privatization of domestic animal ownership.

In order to cope with this situation, a "Master Plan for Education and Development of Human Resources" was formulated in 1994, and such measures as the decentralization of educational control, provision of junior high schools in local areas, revision of textbooks, improvement of vocational schools, and provision of dormitories, are being taken under the plan. In addition, the "Law for the Preservation of Historical and Cultural Properties" was enacted in 1994, and measures for improving cultural services, particularly in rural districts, are being taken.

5) Communications, farmers' self-governed organizations, and mutual aid

Communication systems between Aimag and Sum offices are relatively well provided and maintained, but communications between Sum offices and nomads are accompanied with some difficulty because of the nature of the nomadic way of life.

Information from an Aimag, in many cases, is delivered by the head of a Sum or the president of a company, but this can be quite a difficult task because nomads are scattered about the district. Newspapers published by the Aimag once every week are the most significant means of providing information. Today, after the dissolution of NEGDEL, nomads who do not belong to any company go through more inconvenience than before, as deliveries of information and mail were handled by NEGDEL in the past.

Self-governing bodies of farmers hold community meetings in Bags, in which one member from each household participate. Sum meetings, which rank above community meetings, are also held, while meetings of representatives from Sums are held at varying intervals.

Aimag officials select one person from every ten nomad households and listen to what they have to say about Aimag administration to solve problems. Thus, the system for listening to views of residents has been more improved than before.

As for mutual aid, neighboring nomads work together to secure feed for passing the winter and make felt which is the material for houses, as well as help each other when they are faced with a problem which affects their daily life.

6) Customs and life style

There was no freedom of religion in the days of socialist government, but today people have the freedom of religion. Since nomads live in various grassland areas in which the natural environment varies from one grassland area to another, they have created their own unique milk culture. They use a traditional technique to make dairy products from the milk of farm animals adapted to the particular environment, and consume them as staple food over a period from summer to fall. Meat required for the winter period is obtained by slaughtering domestic animals from November to December, and keeping them in a natural freezer.

In the area of property inheritance, farm animals, household effects and accessories (pipes, bellows, earrings, saddles, etc.) are divided among children when children get married and become independent. The youngest child succeeds his parents and preserves the house. Nomads start working before the sun rises, and generally go to bed around 11 PM. They take light meals consisting of milk tea, cheese and bread for breakfast and lunch, and they often eat meat, rice and noodles in the evening. They listen to radio programs at night as the only pastime. Household goods are kept to a minimum because of the frequent moves they have to make. Wood is used for fuel, and farm animal dung is used when there is a shortage of wood. Since electricity is not available, nomadic families use candles at night. Sums have shops which sell daily necessities. Nomads who cannot go to such shops use a pick-up service company located in the Sum to obtain daily necessities and to deliver their products. Any Mongolian national aged over 18 has the right to vote. The voter turnout of nomads is always high because ballot boxes are brought around to their places which are far from regular polling stations.

3.6 Infrastructure

1) Roads

The Ministry of Infrastructure Development is responsible for the following roads in Mongolia:

National highways:	11,250 km
Local roads:	38,000 km
Total:	49,250 km

Of these roads, 1,303 km are paved with asphalt, while another 3,074 km of roads are graveled. Other roads which are not controlled by the Ministry of Infrastructure Development include wheel tracks made by passing automobiles in grasslands and deserts.

Table 3.6.1 shows the road density in the Study Area including national highways. This table indicates that the road density around Ulaanbaatar is about 1.8 km/km^2, but that the road density in other aimags is as low as 0.03 to 0.06 km/km^2.

Table 3.6.1 Road Density in the Study Area (km/km^2)

Item	Selenge	Tov	Ulaanbaatar	Bulgan	Ovorhangai
Road (km)	2,337	4,839	2,420	2,095	1,936
Area (km^2)	44,430	78,750	1,360	49,570	62,900
Road length per area (km/km^2)	0.053	0.061	1.779	0.042	0.031

(1) Farm roads

Provincial governments are responsible for constructing and maintaining provincial roads and other local roads. Each aimag formulates road construction plans but has implemented virtually none of them, except for doing some repair work during the harvest season as it cannot raise sufficient funds.

Farm roads connecting large farms and flour mills in rural districts with trunk roads including national highways and provincial roads are in poor condition. Not only river crossing structures such as bridges and culverts but also the routes themselves are not properly built or maintained. Thus, drivers have difficulty in moving their vehicles

during and after rain. As a result, drivers choose places with firm ground in the natural grassland through which to pass. This is the reason why destruction of grasslands in the vicinity of roads is conspicuous.

(2) Village roads

Almost all of the roads built in the farm village where a Sum office is located, or a large-scale (former State farms, etc.) farm or farm product processing facilities such as a flour mill are constructed are covered with earth and sand, but are not provided with gutters for draining water from the road surface. In addition, they are not maintained either.

2) Electricity

(Thermal power generation)

Electric power transmission facilities in the Study Area constitute the central energy system (CES) which connects each of the plants in the country. The CES is also connected to the Russian transmission network so as to be able to receive power supply from Russia (Figure 3.6.1).

The facilities in the Study Area are capable of generating approximately 762 MWh of electricity as of 1994 (Table 3.6.2), mainly from thermal generation from coal. However, as generators have become obsolete, power generation capacity has dropped to a level below the country's total consumption of 543 MWh. Therefore, about 20 to 30% of the total demand is supplied from Russia under a contract for provision of 40MWh of electric power daily.

(2) Small-scale hydroelectric power generation

Mongolia has only one small-scale hydroelectric power plant (526 kW). It was built in Harhorin, Ovorhangai aimag in 1961 with aid from China. However, the power plant has become obsolete and deteriorated, and one of the two generators is no longer in operation.

(3) Electrification of rural areas

In the rural areas outside the supply network of the CES, diesel generators placed at each ex-state farm produce electric power. However, electricity is supplied by the hour due to the obsolete generating facilities and low generating capacity.

In the Study Area, while small-scale wind power generators and small-scale gasoline generators have recently been used by some of the nomads, their usage is still very limited.

3) Water supply and sewerage

Water supply and sewerage systems exist in major cities such as Ulaanbaatar. Water sources are rivers, underground water and deep wells. Tap water is available for 40% of the urban population living in apartment houses. The remaining 60% living in houses or Geru are supplied from water tank trucks or carry water by themselves from water stations scattered in various locations. All cities have sewerage disposal plants and seem to exercise strict controls over the quality of disposed water when discharging into rivers. With the recent growth of the urban population, these plants are running at their full capacity. The construction of additional plants is on the drawing board, but is not being realized due to a lack of funds.

Table 3.6.3 shows the findings of a survey of farm households. The tap water supply rate ranges from 0 to 23.5% of all households surveyed, while the sewerage provision rate ranges from 0 to 4.5%. This indicate that the rural area lags behind the urban area in the construction of water supply and sewerage systems. Nomadic people use wells, springs and rivers as water sources. Since wells freeze in winter, they must get water from unfrozen springs and by melting ice.

Table 3.6.3 Findings of a Study of Farm Households

Item	Selenge	Tov	Bulgan	Ovorhangai
Number of Sums	18	28	15	18
Number of Household	1,7942	22,944	11,635	23,075
Holdings of Telephone	1,346	755	1,483	1,980
Diffusion of Telephone	7.50	3.30	12.70	8.60
Number of Tap water supply	68	30	0	424
Tap water supply rate (%)	3.8	1.2	0	23.5
Number of Sewerage provision	82	8	0	1
Sewerage provision rate (%)	4.5	0.3	0	0.1
Paved rage of village road (%)	0	0	0	0

4) Wells

In the Study Area, well water is used for domestic, industrial and livestock farming purposes. In the southern part of Ovorhangai Aimag covered by this study Area, the annual rainfall is less than 150 mm, and few rivers exist from which water can be drawn. Therefore, people have to rely on ground water not only for domestic use but also for livestock farming.

Table 3.6.4 shows the state of well use in 1994 in each of the Aimags located in the Study Area. Of the 7,915 wells located in the Study Area, 82% were in use. However, the remaining 18% were not used for such reasons as broken pumps, etc. Some of the wells were dried up. A review of the state of well use by Aimag shows that 63 to 65% of the existing wells were used in Ovorhangai and Bulgan Aimag, representing about 20% less usage than other Aimags. Most of the pump facilities for wells used in Mongolia were made in the former Soviet Union and installed in the early 1970s with aid from the that country. More than twenty years have passed since they were installed. The facilities themselves have become obsolete, and the replacement time has already passed. As a result, they are developing a wide variety of problems one after another.

5) Communication facilities

(1) Telephone Service

Many telephone lines are provided in Ulaanbaatar city, and telephones are installed in many ordinary households. However, only a few telephone lines are laid in local cities. As a result, phone service is available mainly for public facilities such as Aimag offices and company offices, and for a very limited number of homes only. As can be seen in Table 3.6.3, 12.7% of all households have a telephone in Bulgan Aimag while the household penetration rate in other Aimags is very low, ranging from 3.3 to 8.6%.

(2) Broadcasting

There is one state-owned TV channel in Mongolia. Some Aimags including Bulgan Aimag set up TV stations on their own and broadcast news and other programs. As for radio stations, an FM station in Ulaanbaatar broadcasts programs in Mongolia. In addition to this, cable radio broadcasting is available. Receivers are installed in public facilities and hotels, and news and entertainment programs are broadcast. The

diffusion rate for radios is high in the country while TV sets have a very low diffusion rate of the only 20 to 25%.

3.7 Organizations Concerned

3.7.1 Structure of national government

1) Structure of the central administration

The structure of the national government with President at its top is shown in Figure 3.7.1.1. and is built on the principle of respective independence of powers of the President, legislation, administration and judiciary. The single-chamber system is adopted by the country for the legislature branch is served by the Great National Congress. The executive branch consists of nineteen ministries and departments, while the judicial branch is made up of the courts and prosecuting organs.

The authorized number of officials and budget (personnel expenses) for each ministry and agency are as shown in Table 3.7.1.1. The authorized number of officials for the ministries and departments except for the Defense Ministry, the Ministry of Home Affairs and the Central Police Office (data for those were unavailable) is 1,153. The calendar year is used for the fiscal year in the national budget in Mongolia. Due to the significant effects of inflation, the size of the national budget has continued to increase from Tg 70 billion in 1990 to Tg 520 billion in 1993, representing a more than 7-fold increase over a period of only four years.

2) Administrative structure for the Ministry of Food and Agriculture

The administrative organization chart and prescribed number of officials of the Ministry of Food and Agriculture are shown in Figure 3.7.1.2. The ministry consists of 71 officials in five departments and two divisions, in addition to the Minister and Vice Minister. This organization also includes the Ministerial Council and the National University of Agriculture.

The Mongolian government has scaled down its administrative structure substantially: It reduced the number of officials from about 300 before 1989 to 200 in early 1990 by transferring the Department of Light Industry to the Ministry of Industry and Trade. It further reduced this number to 100 by the end of 1990, then to 75 in 1992, and to the present level of 71 in 1993 (including ten staff members such as janitors, etc.). The budgets for the Ministry of Food and Agriculture for 1994 and 1995 are shown in Table

3.7.1.2. The 1994 budget includes personnel expenses of about Tg 17 million (about US $43,000) and project expenses of about Tg 1.4 billion (about US $3,500,000).

The major tasks of the Ministry of Food and Agriculture include:

[1] Ministerial Council: Agricultural policy decision-making organ consisting of ten officials including one vice minister

[2] Administration Department Tasks involving the entire ministry including policies, budgets and personnel

[3] Economic and International Cooperation: Tasks involving agricultural economy, formulation of policies to improve the living standard of herders, and technical cooperation with international agencies and donor nations

[4] Animal Husbandry Department: Livestock production and breeding

[5] Crop, Machinery, and Irrigation Department: Tasks involving the crops including wheat and vegetables, agricultural machinery and irrigation facilities

[6] Food Department: Tasks concerned with the demand, production and supply of food

[7] Auditing Division: Tasks related to auditing of the ministry budget

[8) State Veterinarian Service Division: Tasks involving veterinary care, treatment, and quarantine services for animals

[9] National University of Agriculture: Tasks involving education, experiments and research regarding the entire field of agriculture

MOFA proposed to restructure its organization drastically to the parliament (Fig. 3.7.1.3). The proposition was approved held in the autumn of 1995, however, the role of the department and when to be effective are not clear and section, detailed organization.

3.7.2 Local administrative structure

The local administrative system is prescribed by new constitution the Administrative Management Law which became effective in August 1992. The local administrative structure was partly modified in April 1994, so that Mongolia is now divided into 21 Aimags (aimags) and Ulaanbaatar city, the nation's capital. Administrative units take the following form: an Aimag is divided into Sums (sum), while a Sum is divided into

Bags (villages). Ulaanbaatar city is divided into Duureg (wards), and a Duureg is divided into Horoo (precincts).

Aimags, Sums, Duureg and Ulaanbaatar city are administrative units which are legally recognized as having a certain degree of autonomy from the central government. The governor of an Aimag and the mayor of Ulaanbaatar city are recommended by the local assembly and appointed by the Prime Minister. Governor and mayor assume office for a term of four years.

1) Aimag structure

All Aimags are structured almost in the same manner with each other. As a typical example of the six Aimags and one city located in the Study Area, the structure of Bulgan Aimag is described below.

(1) The administrative organization chart and prescribed number of officials are shown in Figure 3.7.2.1. It consists of 64 officials in 7 departments (the Department of Security with 123 officials is excluded) in addition to the governor and vice governor. The only department which relates to the Ministry of Food and Agriculture is the Department of Food, Agriculture and the Natural Environment, which is staffed with 10 officials.

(2) The Department of Food, Agriculture and the Natural Environment formulates plans for the supply of food within the Aimag, agricultural and livestock production, and the conservation of the natural environment. It also implements various projects, provides guidance and carries out weather observations. The Department has a Livestock Veterinarian Section, Livestock Improvement Section, and a Hydrology and Weather Section, each of which works in cooperation with local organizations at the Sum level.

(3) The budget for the entire Aimag for 1993 (personnel expenses and project expenses) was about Tg 764 million, while the budget for 1994 was about Tg 1,228 million (US $3,070,000). The budget for the Department of Food, Agriculture and the Natural Environment was about TG 52 million in 1993 and about Tg 65 million (US $163,000) in 1994 (Table 3.7.2.1).

3.7.3 Organizations concerned

1) Steering Committee

When laying out, implementing and supervising various development plans including agricultural and livestock development, a steering committee consisting of

representatives of various organizations concerned is set up. Organizations of the steering committee for the "National Programme on the Population's Food Supply Improvement" and the role of each organization are described below.

(1) National Development Board
Provides basic economic indicators, determines required types and amounts of investment, promotes establishment of conditions for optimum utilization of foreign investment, loans and donor country assistance, and formulates national development plans.

(2) Ministry of Population Policy and Labor
Engages in policy making for improving household self-sufficiency in food and providing food aid to impoverished segments of the population, lays out measures for enhancing interest, health and the living standards of women.

(3) Ministry of Welfare
Implements measures for achieving required levels of nutrition of the general population, evaluates real indicators of local areas, addresses problems concerned with micro element deficiencies, and exercises supervisory control over food sanitation and hygiene.

(4) Ministry of Science and Education
Develops and provides education and training concerning technologies for managing the production and processing food

(5) Ministry of Nature and Environment
Utilizes and protects environmental resources for the supply of food, and implements measures for improving water supplies

(6) State Statistical Office
Collects and collates statistical data related to the program and provides statistics for various organizations concerned.

(7) Ministry of Finance
Evaluates the effects brought about by the implementation of social and economic measures, supervises distribution and expenditures of funds.

In addition to the above-mentioned ministries, the Ministry of Energy, Geology and Mines, the Ministry of Trade and Industry, and the Ministry of Foreign Relations are also involved in this Master Plan.